



# Hydro Spill Reporting

## Definition of Terms and Categories:

### Hydro Spill

For the purposes of spill reporting, spill occurs when water that may have been used to generate electricity is diverted away from a generation plant and becomes unavailable for generation at that plant.

### Plant Category

The Plant Category applies to a scheduled, unscheduled or unforeseen limitation of a generator unit, station, gates or other plants and structures to utilise riverflows, lake storage or upstream station outflows requiring bypassing the aforementioned. Regular testing of gate control structures to ensure proper operation is required and may also result in very brief releases.

### Obstruction Category

The Obstruction Category results when physical obstructions prevent the operation of a generator unit, station, gates or other plants and structures utilising riverflows, lake storage or upstream station outflows requiring bypassing the aforementioned. Most generators have screens on water inlets to catch large debris. The most common obstructions include plant material, logs, silt. Regular cleaning is required by divers physically clearing debris requiring unit or station shutdown for safety. Failing to keep the intakes clear can result in severe damage to plant and structures.

### High Flow Category

The High Flow Category relates to very high flows most likely due to high rainfall, snowmelt, flooding or any combination. There is a finite volume of water that generator units and power stations are able to pass for producing electricity. This usually occurs when lakes or rivers are at their capacity limits or approaching them very quickly. Failure to manage these events can increase the effects of flooding and damage exponentially. However, managing these events can be difficult as weather can be unpredictable. Weather predictions are heavily relied upon in these situations and if release is instigated there are guidelines and restrictions once a flow has been established, and some flows may continue beyond the high inflow event even if the event turns out to be relatively small. There is also a lag time between when the heavy rainfalls/snowmelt occurs and peak high flows which is why some spill may start at night or on clear sunny days.

### Regulatory Category

The Regulatory Category refers to spill required as a result of resource consents, regulations or statutes etc but excludes recreational arrangements. Meridian has consented obligations to maintain minimum River flows on the Lower Waiau River, Upper Ohau River and Lower Waitaki River for recreational, ecological and irrigation requirements. There are also obligations on water clarity at Lake Manapouri requiring increased release flows to clear away suspended sediments causing dirty water. Other minimum flow obligations are seasonal relating to fish spawning in the Waiau and Waitaki Rivers.

### Contractual Category

The Contractual Category refers to a contractual arrangement in place to allocate water to consented users other than Meridian. Meridian is consented to supply recreational flows on weekends and holidays through the summer. This code only applies when the operator has no discretion over avoiding the release.

### **Recreation Category**

The Recreation Category where water has been used for recreational purposes that required or resulted in spill. Meridian is consented to supply recreational flows on weekends and holidays through the summer. Meridian has a unique position on the Tekapo Canal System to supply recreational releases without significant loss of generation. Water taken from Lake Tekapo for recreational purposes (which is the bulk of recreational release by Meridian) in the Upper Tekapo River are diverted back into the Tekapo Canal with the single unit Tekapo A station being bypassed.

### **Cost Category**

The Commercial Category refers to spill for commercial reasons arising from the spot price not meeting the hydro generator's threshold for that plant's short run marginal price for operation. The threshold is at the discretion of the hydro generator and subject to audit through the compliance regime.

### **Economic Category**

Due to the size and capacity of generation stations and head pond lakes in the Waitaki River Scheme hydraulic constraints can occur limiting the ability to continue a high supply of electricity generation without additional water bypass. Some upstream stations may have a higher capacity to pass water than the immediate downstream station, as a result while running at maximum output water may have to bypass the down stream station to maintain the high generation output. The opposite case may occur where the downstream station has a higher capacity than the up stream station this may drain the immediate storage; as the upstream station cannot output enough water to maintain an adequate water supply, additional water needs to be bypassed to provide enough water for the downstream station to generate to capacity. In these situations avoiding spill will lead to a reduction in generation output requiring more expensive plant to make up the electricity generation needs.

### **Transmission Constraint Category**

The Transmission Category results where constraints on transmission circuits limit the ability or output of a generation station of unit. As a security or a physical limit to transmission lines, Transpower sets limits to circuits and transmission line capacities for security of supply, maintenance work repairs. Transmission lines have thermal limits that change over summer and winter due to the amount of electricity they are trying to carry. As with any other limitation to generation, if a grid, circuit or transmission line is constrained the ability to use water for generation at particular stations or units is compromised. An example for Meridian is Benmore and the HVDC link where Benmore must have some units generating in order supply electricity through the HVDC link between North and South Islands.

### **Hydrolic Constraint Category**

The Hydraulic Category results where capacity differences within hydraulically coupled schemes requiring additional water bypass to maintain output. Some upstream stations may have a higher capacity to pass water than the immediate downstream station, as a result while running at maximum output water may have to bypass the down stream station to maintain the high generation output. The opposite case may occur where the downstream station has a higher capacity than the up stream station this may drain the immediate storage; as the upstream station cannot output enough water to maintain an adequate water supply, additional water needs to be bypassed to provide enough water for the downstream station to generate to capacity. In these situations avoiding spill will lead to a reduction in generation output requiring more expensive plant to make up the electricity generation needs.

## **Other Category**

The Other Category refers to spill for which a standard explanation is not applicable. This may mean that an unforeseen circumstance has occurred that made spill unavoidable. This may include public or other human safety, structure or plant safety and National Security among other things. The Other Category may mean that there isn't a reasonable explanation, and is at the discretion of the hydro generator and subject to audit through the compliance regime.