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GUIDANCE ON THE SETTING OF TRIGGER VALUES FOR STORM WATER DISCHARGES TO OFF-SITE SURFACE WATERS AT EPA IPPC AND WASTE LICENSED FACILITIES

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Introduction:

Where integrated pollution prevention control (IPPC)/waste licences issued by the Agency specify that storm water discharges to off-site surface waters shall be monitored for set parameters, the licence will not specify any emission limit values as the discharge should only consist of storm water, roof-water or other such uncontaminated, natural waters. However, the agreement of trigger levels between the licensee and the Agency is often a requirement of the licence.

The status of and possible impacts on receiving waters from storm water discharges must be considered, bearing in mind that the Water Framework Directive (WFD) requires no deterioration in the status of a water body. Any contamination of the storm water can affect this status and trigger levels on the discharge can be utilised as a tool to ensure the maintenance of the status of the stream.

The use of trigger levels at sites must be done appropriately having regard to the following:

1. The status of and possible impacts on the receiving water,
2. The parameter should be of such significant interest to warrant the setting of a trigger level, and
3. An appropriate parameter(s) is selected relevant to the site and its activities.

Trigger level is defined in the licence as:

Trigger level	A parameter value, the achievement or exceedance of which requires certain actions to be taken by the licensee.

Typical licence conditions covering storm water discharges include:

1. *A visual examination of the storm water discharges shall be carried out daily. A log of such inspections shall be maintained.*
2. *The licensee shall, within six months of commencement of the activity, establish suitable trigger levels for pH and TOC in storm water discharges, such that storm waters exceeding these levels will be diverted for retention and suitable disposal.*
3. *The licensee shall have in place a response programme to the achievement or exceedence of trigger level values. This response programme shall include actions proposed to ensure there will be no emissions to surface water of environmental significance.*
4. *The trigger levels for storm water discharges from the facility measured at the monitoring point SW1 are:*

    a) Zinc X mg/l

    b) Iron Y mg/l

    c) Other parameters as required by the Agency.

The trigger level condition has the function of providing for early detection of likely contamination problems such that intervention can be put in place (e.g. shut off discharge, stop leak etc.). It is **not an emission limit value** (ELV) or an Environmental Quality Standard (EQS) as prescribed in the European Communities Environmental Objectives [Surface Waters] Regulations 2009 (SI No. 272 of 2009), and should not be relied on as such.

In many instances licensees have been found to;

1. Discharge waters which the Agency would consider contaminated,
2. Have set inappropriately high trigger levels, or
3. Permit discharges to storm water with higher pollutant levels than the ELVs set for their licensed emissions to waters (i.e. process waters) for the same parameters.

In order to clarify a range of acceptable values for certain parameters the need for guidance for licensees on the setting of trigger values for storm water discharges to off-site surface waters has been identified.

Parameters:

The parameter for which a trigger level is defined should be an appropriate indicator for on-site sources of contamination, and if possible be the same as an established Environmental Quality Standard (EQS) parameter, or one where a relationship can be established with a substance for which an ELV has been set for other discharges onsite e.g. TOC vs. COD.

The following parameters have been routinely utilised in IPPC/Waste licences for the monitoring of storm water discharges.

- Chemical Oxygen Demand (COD)
- pH
- Total Organic Carbon (TOC)
- Suspended Solids (SS)
- Metals
- Ammonia
- Temperature
- Conductivity

Continuously Monitored Parameters:

Ideally, for trigger levels to be of most value, continuous monitoring is required (when emissions are taking place). Where continuous monitoring is in place an alarm system, or operator inspection system that is proportionate with the need to provide continuous early warning/protection and response is necessary.

A risk assessment should be undertaken to assess the adequacy of the retention time in the storm water drainage system against the total analysis cycle time in the continuous monitor. While all analysis has a delay and this issue must be approached pragmatically, the potential risk(s) due to sensitivity of the receiving body and possible contaminants etc. should be assessed. It should be remembered however, that diversion of storm water should be a last line of defence and adequate control measures should be in place onsite (e.g. bunding, good housekeeping practices, transfer procedures and controls, spill kits etc.) to prevent contamination reaching the storm water drainage system. The need for investment or upgrading of the storm water system following this assessment should be proportionate to the risks involved.

Non-Continuously Monitored Parameters:

Some licences have required the setting of trigger levels for non-continuously monitored parameters e.g. metals and SS. This is not considered an ideal situation because action cannot be taken as soon as the problem occurs, only when it is identified. However, it is considered necessary to permit the use of non-continuous monitoring techniques due to the nature of on-going contamination issues at certain installations/facilities and the fact that not all parameters can be continuously monitored. In these instances, the period allowed between samples should reflect the degree of the contamination risk and the sensitivity of the receiving environment. Sampling frequency and analytical turnaround times are required to be of sufficiently short intervals to allow the early identification of any contamination event.

There can be a slow turnaround times on some forms of analysis e.g. metals; however, some licensees have put in place agreements with contract laboratories to have an immediate notification if they exceed trigger levels/ELVs, so that an investigation can be initiated as soon as possible. All licensees should look to have similar arrangements with their laboratories, where necessary. A minimum sampling frequency of at least weekly would be considered appropriate; if a parameter is of such significant interest to warrant the setting of a trigger level then this should be reflected in a reasonable frequency of monitoring.

Baseline Monitoring:

Trigger levels should be set on a site specific basis and should be set after a sufficient period of monitoring (12 months ideally after the commencement of activities, to account for seasonal variation) of the storm water discharge to establish the range of 'normal' background levels.

If contamination is already on-going at the site, then other options must be considered, such as sampling from clean yard areas or roof water; however if this is not an option, it may be the case that trigger levels have to be set on a generic and fit for purpose basis at contaminated sites, with reference to the appropriate standards e.g. European Communities Environmental Objectives [Surface Waters] Regulations

2009 (SI No. 272 of 2009). Trigger levels must not set at a level which would result in contamination or deterioration in the status of the receiving water body. As stated, they are not ELVs; and emissions through the storm water system are not permitted. This aspect must be considered in any proposal to the Agency.

This can be more difficult at sites where activities are on-going for a number of years and 'clean' areas are not available e.g. some galvanisers and materials recovery/waste transfer stations. These sites are often located in industrial estates and discharge to a surface water collection system, not directly to a water body. However, it must be borne in mind that storm water should only consist of storm water, roof-water or other such uncontaminated, natural waters. Discharging to a collection system is not a sufficient reason to allow for poor housekeeping practices onsite which allows for the contamination of the storm water as it is deemed to have 'no impact' or the impact 'is not possible to quantify'. Process/contaminated emissions through the storm water system should not be allowed to occur.

The number of samples that are taken to establish the background baseline variability is extremely important. The more sample data available, the better the estimate of background levels. Sample times should be varied to account for all weather types, times of the day/month/year, and plant operations. Samples taken at very low flow or stagnant conditions in the storm water drains could lead to spurious results and should be avoided. In addition care needs to be taken to avoid disturbing the sediment during sampling and samples should not be taken directly from interceptors.

A simple check on the adequacy of the sampling number is to look at the values for average and standard deviation. A large standard deviation (SD) may indicate insufficient sample numbers e.g. TOC data average of 10mg/l SD 5mg/l (Relative SD 50%), versus a TOC average of 10mg/l, SD 2 mg/l (RSD 20%) i.e. what percentage of the average is the standard deviation. In the example given, the latter indicates a much smaller, more desirable level of variation around the mean. It is desirable that standard deviation is calculated on at minimum of 20 data points (preferably a years' worth of weekly samples, i.e. +50 data points) to reflect the range of natural variability over most sampling conditions. If the frequency of monitoring set in your licence would result in a significant period required before 20/50 sample results are collected (i.e. >12 months) the frequency of monitoring should be increased during this assessment period to at least weekly

During this evaluation process any samples identified as likely to have been contaminated by onsite processes, should not be included when calculating the mean and SD values of the storm water discharge, as this would not give an accurate reflection of 'normal' values and would result in the setting of trigger levels which are too high.

Once the data is available, the next step is deciding how the trigger values should be set. Two approaches could be used here:

1. The average plus 2 standard deviations for warning limit and the average plus 3 standard deviations for the action limit.

2. The 90%ile and 95%ile values could be used as the warning and action limits respectively.

Care should be taken not to set the values so tight that resources are wasted responding to non-contamination events.

Once the baseline values have been set up and agreed by the Agency, they should be reviewed periodically to ensure the robustness and suitability of the values established.

A review of storm water monitoring results at Agency sites would indicate that the values given below, Table 1; have been commonly used. It should be noted however, that these values are based on a limited number of sites and are for guidance only. Trigger levels must be set **on a site specific basis** and should *only* be set after a sufficient period of storm water monitoring. The values in Table 1 may be employed, subject to appropriate caution, during the period over which the site specific data is being gathered.

Table 1: Examples of Action and Warning Limits in use at Agency sites.

Parameter*	Action (Upper) Limit (mg/l)	Warning (Lower) Limit (mg/l)
COD	80	50
TOC	40	30
SS**	50	25
pH	6 to 9	6 to 8

***The most appropriate parameter(s) to reveal onsite sources of contamination for the site/sector shall be used.**

****If the storm water discharges to a very small receiving stream, which is also a salmonid spawning river an action level of 50 mg/l for SS, may be too high to ensure maintenance of the status of the stream bearing in mind the WFD.**

Metals**:** It is very difficult to set broadly applicable limits for metals in storm waters, as some metals such as iron and manganese are common and widespread in nature, and natural waters in certain areas contain relatively high concentrations due to the local geology. Conversely, situations have occurred where metals have built up in the sediment downstream of storm water discharges from installations/facilities; this has resulted in contamination of the sediment and costly clean-up programmes. If metal contamination is a possible issue at the site, trigger levels should be set. The EQS levels are a good source of primary information, especially for priority substances and priority hazardous substances (Schedule 6 of S.I. No. 272 of 2009), and locally derived data for the receiving water body should also be reviewed, or if necessary obtained by monitoring in conjunction with the baseline monitoring of the storm water discharge itself.

Ammonia: In any natural water body, there is equilibrium between the two forms of Ammonia; Ammonium (NH4+), which isn't particularly toxic to aquatic life, and unionized ammonia (NH3), which is toxic at elevated concentrations. In most situations installations/facilities need not be overly concerned at the form of the ammonia in the water body; however, in setting the trigger level for ammonia, care

should be taken that the total ammonia trigger levels are specified with due regard to the potential for occurrence of excessive unionised ammonia given the prevailing pH and temperature conditions at the site and in the receiving water body.

The current EQS levels for river and lakes for total ammonia (mg/l N), range from good to high status of ≤ 0.065 to ≤ 0.04, respectively. A review of results from storm water sample results at Agency sites found that 60% of total ammonia values were < 0.3 mg/l N with around 70% <0.5 mg/l N rising to ca 80% <1 mg/l N. Sites with values higher than this were known or suspected to have ammonia contamination of storm water. Possible trigger and action values could therefore be reasonably expected to be around 0.3/0.5mg/l N and 1mg/l N respectively, for total ammonia, with due regard to the ambient pH and typical temperature regime as indicated by the baseline dataset.

However, licensees are again reminded that all trigger levels should be set on a site specific basis and these values are for guidance only.

Response Programme:

There is little point in a site putting warning and action levels in place for storm water monitoring if this is not linked to a documented response programme in the event of reaching or exceeding of trigger level values. To ensure consistency of approach, the following points must be addressed in conjunction with the trigger values:

1. Where TOC/pH etc. is utilised as a continuous monitoring parameter, readings at or in excess of a warning limit shall require an investigation. Readings at or in excess of the action limit shall require activation of the shut-off valve/ diversion to holding pond, investigation and notification of potential contamination of the SW discharge to the Agency in accordance with the Agency's "Guidance on the notification management and communication of Environmental Incidents".
2. All continuous monitors must be calibrated and maintained in accordance with the instructions issued by the manufacturer/supplier or installer. It is also important to ensure the probes and sample lines are located appropriately to prevent/minimise fouling and to collect a representative sample of the discharge.
3. For grab samples, where values equal to or in excess of the warning limit are obtained on three consecutive occasions an investigation is required. Where a value equal to or in excess of the action limit is obtained, an investigation and notification of potential contamination of the SW discharge to the Agency is required in accordance with the Agency's "Guidance on the notification management and communication of Environmental Incidents". During this investigation period the frequency of monitoring should be increased, in agreement with your enforcement inspector, until such time that the source of the contamination has been identified and eliminated.

Points to Note in the Investigation of Potential Storm Water Contamination:

Contamination may arise from numerous sources, some of the more common ones are:

1. Spillages/overflows, often from sumps close by,
2. Deliberate actions,
3. Leakages,
4. Misdirection/ incorrect connection of pipes, foul sewer pipes, pipes from hand-basins etc. into storm-drains.
5. Seasonal factors such as autumnal leaves and wash-out of accumulated dust/ debris/ residues following prolonged dry spells, or use of salt/grit on surfaces during frosty conditions. Values from this source should still not equal or exceed the warning and action limits; if they do, there are most likely other factors involved.

To address storm water contamination in older sites, blow out/ clean down of the storm water system, including any associated sumps or tanks by an approved contractor may be an option. This blow/clean down water cannot be directly discharged to the storm water system. Following such action, if the issue is unresolved then sources listed above may be the most likely potential cause(s) and should be the focus of the investigation.

The Agency expects all relevant facilities to have appropriate and up to date trigger levels in place backed up by on-going inspection, response programmes and appropriate maintenance of storm water management systems. Agency site inspections/audits will regularly focus and these issues. Any issues or queries in relation to this guidance or other general issues with the specification, monitoring and compliance with trigger levels should be discussed with your Agency inspector. This guidance may be updated periodically and relevant stakeholders should ensure that they are using the most up-to-date version by checking periodically for updates on the EPA website – www.epa.ie.