ECAN Dairy Effluent Consent Monitoring Results – 2006/07 to 2008/09

Effluent Compliance per farm

- No Significant or Majorly Non-Compliant
- No Farms Fully Compliant
- Total No Farms

<table>
<thead>
<tr>
<th>Year</th>
<th>No of Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td>06/07</td>
<td>623</td>
</tr>
<tr>
<td>07/08</td>
<td>696</td>
</tr>
<tr>
<td>08/09</td>
<td>851</td>
</tr>
</tbody>
</table>

Compliance with Consent Conditions

- Number Conditions Fully Compliant
- Total Number Conditions Monitored

<table>
<thead>
<tr>
<th>Year</th>
<th>Total No Farms</th>
<th>No Farms Fully Compliant</th>
<th>No Significant or Majorly Non-Compliant</th>
<th>% Fully Compliant</th>
<th>% Significant or Majorly Non Compliant</th>
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</thead>
<tbody>
<tr>
<td>06/07</td>
<td>623</td>
<td>247</td>
<td>110</td>
<td>39.6%</td>
<td>17.7%</td>
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<tr>
<td>07/08</td>
<td>696</td>
<td>319</td>
<td>139</td>
<td>45.8%</td>
<td>20.0%</td>
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<tr>
<td>08/09</td>
<td>851</td>
<td>368</td>
<td>164</td>
<td>43.2%</td>
<td>19.3%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number Conditions Monitored</th>
<th>Number Conditions Fully Compliant</th>
<th>Percentage Fully Compliant</th>
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</thead>
<tbody>
<tr>
<td>06/07</td>
<td>6102</td>
<td>5452</td>
<td>89.3%</td>
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<tr>
<td>07/08</td>
<td>6443</td>
<td>5767</td>
<td>89.5%</td>
</tr>
<tr>
<td>08/09</td>
<td>8851</td>
<td>7810</td>
<td>88.2%</td>
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</table>
Considerations re Compliance

What does ECAN want?

- Voluntary compliance - good sustainable practices in compliance with consent or permitted activity conditions
- Proactive communication when there are problems - Let us know and we will try and help
- Adequate storage for the number of cows/discharge area; a system that is used efficiently
- A distribution system, preferably spray irrigation, that is well maintained and where all the discharge area is used so that the effluent is used most effectively and there are no build ups of nitrates in any one area
- All farm staff involved in effluent management to be trained in how to best operate the system and to be aware of their responsibilities
- Non-negotiables – no discharge to surface water bodies or soak holes, major ponding

The standard is constantly improving - what was acceptable thirty years ago is now considered poor practice. ECAN’s role is to help the industry with continual improvement, in partnership with Dairy NZ, Synlait, Fonterra, NZ Dairies, Federated Farmers, Fish&Game, Forest &Bird etc.

Compliance Monitoring Visits – the process explained

- Routine visit at least once per year
- ECAN audit according to the consent/permitted activity conditions and in accordance with national protocol
- National protocols agreed by Regional Councils and industry nationwide; ECAN is audited against these. For example, unannounced inspections are part of the national standard and occur in many industries.
- ECAN try to contact the consent holder on arrival at the property or shortly before, and encourage consent holders to accompany Environmental Protection Officers on inspections.
- If the consent holder cannot be contacted on the day, ECAN contact them on returning to the office, provided they have a current contact number of the consent holder (farmers should ensure ECAN has their current contact details)
- The Officer will keep in touch regarding issues of non-compliance and a written report will follow
- The report is provided to assist ongoing compliance; requested actions are provided to reduce the likelihood of future non-compliance – e.g., pumping up tyres on the irrigator or replacing nozzles. Farmers are encouraged to call either their ECAN monitoring officer or their industry rep

Keeping Compliant – Interacting with ECAN when full compliance is not evident

- The officer is on site to carry out an independent audit of the site, and has to call it as they see it on the day, including consideration of measures / technology to mitigate risks
- Let us know why things went wrong and what you are proposing to do to remedy the situation and prevent the same problem occurring in the future
- You may be asked for an interview regarding the non-compliance – this is a opportunity to present your side of the story. It is structured formally – again, we have to abide by national protocols, it doesn’t necessarily mean we are going to take further action
The End of Year compliance report

- This is based primarily on the compliance grade at the time of the first inspection but one section of the report shows the improvements that farmers made when re-inspected. The vast majority of farmers are fully compliant on the second visit and this highlighted in the report.
- There has been little significant change in compliance over the last five seasons.
- Report also presents enforcement actions – abatement notices, infringement notices and prosecutions.
- ECan releases a press statement summarising all aspects of the report, and has no influence over press headlines.

Main findings from SFF 07-016 Canterbury Dairy Effluent Application Efficiency

The system performance levels were variable as a result of a range of factors:

- Poor equipment design (travelling irrigator design giving low uniformity and high application depths and rates) provided limitations
- Poor system design resulted in inadequate pressure and frequent nozzle blockage, further limiting performance
- Operator errors such as incorrect machine speed settings resulted in excessive application depths

Actual application rate of a typical travelling irrigator - applying effluent

![Graph showing actual application rate of a typical travelling irrigator](image)
**Effluent System Overview – LOJO Farm**

1) **System Overview:**
   a) The effluent system comprises of a stone trap, small concrete block sump, new 11kW Yardmaster pump mounted on a 4 x drum pontoon.
   b) Automated stop/start level controls.
   c) The pump station overflow is linked via pipe to a concrete pond which has a “max” of 2 days storage, emptying the storage pond is via petrol trash pump.
   d) The system is well fenced and has two hinged gates for easy access to clean the stone trap and carry out system maintenance.
   e) Mainline reticulation is approximately 600m of ring-main, 80mm OD poly pipe buried and several above ground hydrants.
   f) Effluent area for 560 cows is 35 hectares effective and the system is designed to apply “Fresh effluent everyday”.
   g) The farm manager is responsible for the effluent system and a strong driver to manage the system correctly is compliance.
   h) The effluent management plan, is clear, has a good section on “trouble shooting” and a list of supplier contacts if required.

2) **Safety requirements**
   a) Effluent system is fenced (with signage).
3) The Effluent Consent

<table>
<thead>
<tr>
<th>Resource Consent Number:</th>
<th>CRC011281.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>File Number:</td>
<td>CO6C/17524</td>
</tr>
<tr>
<td>Client Name:</td>
<td>Warnock Park Limited</td>
</tr>
<tr>
<td>To:</td>
<td>to discharge contaminants onto land in circumstances which may result in those contaminants entering water.</td>
</tr>
<tr>
<td>Consent Location:</td>
<td>Buckleys Road, SEAFIELD</td>
</tr>
<tr>
<td>State:</td>
<td>Current</td>
</tr>
</tbody>
</table>

**Events:**
- 27/01/2003 Given Effect To
- 29/01/2003 Lapse Date if not Given Effect To
- 2/07/2003 < Consent Transferred
- 26/01/2016 Consent Expires

**Subject to the following conditions:**

1. Diluted dairy effluent shall only be discharge to onto Section 2 Buckley Settlement at or about map reference NZMS 260 K37: 739-805.
2. The contaminants shall only be dairy cow effluent diluted with dairy shed washdown water.
3. The volume of undiluted effluent discharged shall not exceed 4050 litres per day, calculated using the figures set out in "Table 1 - Daily Volume of Effluent Produced Per Animal" attached to this consent, averaged over 7 consecutive days.
4. The depth of application shall not exceed half the water holding capacity of the soil.
5. Effluent shall not be discharged to land in a manner resulting in an areal nitrogen loading rate greater than 200 kilograms per hectare per year.
6. There shall be no ponding of effluent on the ground for longer than 12 hours.
7. Notwithstanding condition 6, effluent may be stored in a facility, structure or pond, which shall be sealed to ensure that seepage does not exceed one millimetre per square metre per day.
8. There shall be no discharge: a) within 20 metres of any surface water body; b) within 30 metres of any bore; and c) such that contaminants are likely to run-off and enter any surface water body.
9. The discharge shall not cause an odour which is offensive or objectionable beyond the boundary of the property on which this consent is exercised.
10. All reasonable measures shall be taken to ensure that no unauthorised discharge occurs.
11. The Canterbury Regional Council may, on the last working day of June each year, serve notice of its intention to review the conditions of this consent for the purposes of: (a) dealing with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage; or (b) requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment.
Key Points in the Consent:

a) Maximum daily application volume (watch impact of changes in cow numbers)
b) Maximum application depth is no more than half the water holding capacity – What is the water holding capacity of the soil on this farm?
c) Maximum application of Effluent Nitrogen per year is 200kgN/ha/yr
d) Ponding must not occur for longer than 12 hours
e) Set back distances to waterways and bores is a key point for the operation of the system

Note: the stipulation re ponding in this consent is no longer common in consents AND, importantly, ponding for this length of time will reduce pasture production

4) The Management Plan

LOJO farm

Objectives:
1. To fully utilize effluent as an important source of soil nutrients and to be fully compliant with resource consent.
2. For all staff to have an understanding of the effluent systems fully understand its correct operation.
3. For all staff to understand the key components of the consent appreciate the importance of adhering to it.

Consent: CRC 001 026 – to discharge contaminants on to land.

The dairy shed disposal system comprises of a stone trap, sump with 15hp pump on floating pontoon and a concrete over flow storage with capacity for 2 days storage. The effluent is discharged via a 90 mm main line though a traveling irrigator that drags a 50 mm hose with camlock couplings. The overflow storage can be pumped directly back into sump via a portable pump. There is a spare 10 hp pump that can be swapped in the event of a break down

Maintenance and monitoring.

Daily:
- Take all steps possible to minimize water use in the shed.
- Check operation of irrigator – are hoses aligned, is there sufficient area for next milking, is irrigator speed appropriate for soil conditions, are all moving parts in good order.
- Check sump and overflow – has pump finished pumping within 1 hr from end of milking, has there been any effluent flow into overflow, is pump running smoothly.
- Check that there is no ponding / effluent pooling on soil surface within discharge area.
Weekly:
- Grease effluent irrigator and pump. Check for wear to any moving parts.
- Empty stone trap.
- Visual observations of system – have there been any changes in integrity of system.
- Is pump running smoothly.

Annual:
- Replace pump with spare and send into town for service.
- Fully pump out sump & overflow (contractor) and inspect integrity of pontoon and all concrete within system.
- Repair any worn parts e.g. irrigator hose, camlocks, parts in irrigator.

Trouble shooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible consequence</th>
<th>Solution / mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigator stalled</td>
<td>• Ponding of effluent.</td>
<td>• Ensure hose is aligned</td>
</tr>
<tr>
<td></td>
<td>• Effluent running into overflow</td>
<td>• Ensure sufficient area in front of irrigator for next milking/ rain event</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check for any damage/ wear to irrigator &amp; repair/ replace as required</td>
</tr>
<tr>
<td>Poor pressure at irrigator</td>
<td>• Distribution/ ponding issues</td>
<td>• Check for any blockages at pump and irrigator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Silting up of main line – ensure stone trap is kept clean at all times. Flush with water outside milking times.</td>
</tr>
<tr>
<td>Performance issues with pump</td>
<td>• Overflow receiving effluent</td>
<td>• Asses performance and swap pumps if required</td>
</tr>
<tr>
<td></td>
<td>• Poor distribution- potential ponding</td>
<td>• Check that there is no build up of sediment in sump</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check for blockages at pump intake</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Consult service contractors</td>
</tr>
<tr>
<td>Effluent applied within 30 m of well head.</td>
<td>• Major non compliance – possibility of contaminants entering aquifers.</td>
<td>• Ensure a 40 m buffer around wells</td>
</tr>
</tbody>
</table>

Key contacts:
- Pump problems & system problems: KB Irrigation 033089419
- Electrical faults: Laser electrical 033082106
- Sump cleaners Charlie's takeaways 0274335147
- Effluent irrigator repairs Plucks engineering 033027301
- Back up contacts Rainer irrigation 033081593
5) Efficient water use
   a) Backing gate is fitted with scrapper & jet wash.
   b) Average wash down volumes?

6) The Irrigator.
   Plucks LP25, 200m of drag-hose, 2”(50mm)alkathene.
   a) Irrigator setup was correct.
   b) Application rate / test with
      i) Old Pump = 20mm.
      ii) New Pump = 10mm.

7) Trouble Shooting
   a) When trouble shooting system performance, start with pressure checks at the irrigator and work back to the pump.
8) A closer look at the Irrigator.

“Any system leaks will affect irrigator performance.”

a) Main Pivot Boss Leaking.

b) Top ratchet bearing needs replacing.

9) Irrigator Nozzles

a) Nozzle looks OK, but needs replacing.

b) Once the rubber nozzle has lost its tension, the hole size increases and so does the application rate.
10) **Drag hose**
   a) When fitting cam locks have the leavers parallel to the ground.
   b) Make sure the lever on the female cam lock is facing the right direction when pulled up the paddock, as grass will snag and open them if not.
   c) Fit hose clamps with the bolts at the top.

11) **Nozzle Couplings**
   a) Bayonet couplings allow easy removal of nozzles for cleaning – removing the need for tools or delayed maintenance.
12) Application pattern and rate:

![Application pattern and rate graph]

Roadley Farm

- **Old Nozzles**
- **New Nozzles**

**Notes:**

a) Application pattern is skewed due to wind at time of measurement

b) "New" nozzles resulted in a more uniform application pattern, but higher maximum and average application depth

13) Opportunities:

a) Test application pattern / distribution volume
   i) Recommended to test at both the closest and furthest hydrants
   ii) Test once per season
   iii) Useful resources to assist irrigator testing are available at [http://www.pagebloomer.co.nz/resources/tools/dairy-effluent-irrigation-calibration/](http://www.pagebloomer.co.nz/resources/tools/dairy-effluent-irrigation-calibration/)

b) Replace nozzles

c) Long arm / short arm

d) Travelling irrigator control systems (eg Gator Buddy)

e) Code of Practice for Effluent Design and Design Standards

f) AglTO unit standards
   i) for effluent system operators and
   ii) for managers of effluent systems

g) ReGeneration – effluent management tool for determining effluent application rate (see following pages)
In a Nutshell

- ReGeneration is an effluent management tool, based on providing farmers with farm-specific information to support the decision whether to irrigate effluent or not on any given day, and if yes, at what rate.

- A farm is set up with a rainfall gauge, pond level sensor and aquaflex sensor. These are connected to a telemetry device (these are connected via either the cellphone network or wireless/internet) which is automatically sending the readings to our centralized database.

- We have developed, with Massey University, a method of calculating a soil water balance (SWB). This is a representation of the amount of effluent the soil can hold before leaching or direct run-off occurs.

- The SWB drives the decision tree which generates an irrigation recommendation for the farmer. The recommendation is texted to the farmer, or if no cellphone coverage, is available via each farmer’s web view of their information.

- The decision tree takes into account the capability of the farmer’s irrigator type, so the recommendation is relevant to the equipment’s capability.

- It also has the flexibility to incorporate any other farm specific or region specific parameters around irrigation – timing, rates etc.

- ReGeneration will be available in March 2010.

For more information please contact; 0800 3 REGEN

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E: natalie@harmonic.co.nz
Irrigator Tracking

• Developed in conjunction with TracMap

• A travelling irrigator monitoring device is installed on the travelling irrigator to automatically switch off the pump when the irrigator has stopped moving.

• A text is sent to the farmer when the irrigator has been automatically switched off.

• The irrigator can be switched on or off remotely by a text message.

• There is a GPS tracking device, which maps the path of effluent irrigator, creating a record of irrigator movements.

• Maps based reports show where the irrigator has been and match the daily recommendation with irrigation.

Soil Water Balance

• A measure, in millimeters, of how much effluent the soil is capable of holding.

• Once the soil reaches Field Capacity the soil has to lose water to make space for effluent. This happens through evapotranspiration. Rainfall fills the soil back up again.

• Each day ReGeneration calculates the SWB for the farm based on farm specific rainfall and local evapotranspiration rates.

• When the correct amount of effluent is applied, equal to or less than the daily soil water deficit, the soil can hold all the effluent and use the water and nutrients for grass growth with no wastage.