

WORKSAFE

Mahi Haumaru Aotearoa

Health and Safety at Work (Hazardous Substances—Requirements for Specified Fumigants)
Safe Work Instrument 2017 as at 15 September 2023

WorkSafe New Zealand Consolidation

WorkSafe New Zealand consolidation

WorkSafe has developed a consolidated version of this safe work instrument (SWI) so that you can see the original SWI and all its subsequent amendments in a single easy-to-read document.

Disclaimer

This is the current consolidated version of the Health and Safety at Work (Hazardous Substances—Requirements for Specified Fumigants) Safe Work Instrument 2017.

This version:

- has been compiled from the Health and Safety at Work (Hazardous Substances— Requirements for Specified Fumigants) Safe Work Instrument 2017 and its amendments
- is based on the law as it stood as at 15 September 2023
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Health and Safety at Work (Hazardous Substances— Requirements for Specified Fumigants)
Safe Work Instrument 2017

WorkSafe New Zealand Consolidation as at 15 September 2023

History

The Health and Safety at Work (Hazardous Substances—Requirements for Specified Fumigants) Safe Work Instrument 2017 came into force on 1 December 2017 and now incorporates the following amendments.

Amendment	Commencement date
Amendment 1	
Health and Safety at Work (Hazardous Substances—Requirements for Specified Fumigants) Amendment Safe Work Instrument 2022	22 July 2022
Amendment 2	
Health and Safety at Work (Hazardous Substances—Requirements for Specified Fumigants) Amendment Safe Work Instrument (No 2) 2022	23 September 2022

Summary of Amendments

Amendments	Content amended
Amendment 1	
Health and Safety at Work (Hazardous Substances—Requirements for Specified Fumigants) Amendment Safe Work Instrument 2022	<p>Preamble amended Clause 3 amended (Overview) Clause 4 amended (Interpretation) New clause 17 and cross-heading inserted New Schedule inserted</p>
Amendment 2	
Health and Safety at Work (Hazardous Substances—Requirements for Specified Fumigants) Amendment Safe Work Instrument (No 2) 2022	<p>Preamble amended Clause 3 amended (Overview) Clause 4 amended (Interpretation) Clause 6 amended (PCBU must erect signs – Tri-Form 60) Clause 7 amended (PCBU must erect signs – Ripper range) Clause 14 amended (PCBU must erect signs – AFE-HFP) Clause 17 amended (Additional and modified requirements applying to EDN) New Clause 18 inserted (Soil condition requirements – AFE-HFP) New cross-heading and clauses 19 to 24 inserted <i>Requirements applying to Tri-Form 80</i></p> <ul style="list-style-type: none"> - 19 - Tri-Form 80 required to comply with specified regulations - 20 - Notification of intended fumigation – Tri-Form 80 - 21 - PCBUs must erect signs – Tri-Form 80 - 22 - Size of application block – Tri-Form 80

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	<ul style="list-style-type: none">- 23 - PCBU to set buffer zones – Tri-Form 80- 24 - Soil condition requirements – Tri-Form 80 <p>Schedule amended New Schedule inserted (Buffer zone distances for Tri-Form 80)</p>
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**Health and Safety at Work (Hazardous Substances—
Requirements for Specified Fumigants) Safe Work Instrument
2017**

WorkSafe New Zealand Consolidation as at 15 September 2023

This safe work instrument is made under section 227 of the Health and Safety at Work Act 2015 by the Minister for Workplace Relations and Safety, being satisfied that—

- (a) appropriate consultation has been carried out under section 227(3) of that Act; and
- (b) in accordance with regulation 13.46(2) of the Health and Safety at Work (Hazardous Substances) Regulations 2017, for the purposes of clauses 3, 6 to 10, 12, 13, 15(2), 16 and 17 of Schedule 1 of this safe work instrument, compliance with provisions of the Regulations that apply to ethanedinitrile will not appropriately control risk associated with that substance.

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Schedule 1

Additional and modified requirements for EDN

Schedule 2

Buffer zone distances for Tri-Form 80

Safe Work Instrument

- 1 Title**
This is the Health and Safety at Work (Hazardous Substances—Requirements for Specified Fumigants) Safe Work Instrument 2017.
- 2 Commencement**
This safe work instrument comes into force on 1 December 2017.
- 3 Overview**
In this safe work instrument—
- (a) clause 5 modifies, the notification requirements in regulation 14.7(2) of the Regulations (under regulation 14.7(4) of the Regulations) for fumigation using Tri-Form 60:

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- (b) clause 6—
 - (i) modifies the signage requirements in regulation 14.10(1) of the Regulations (under regulation 14.10(4) of the Regulations) for fumigation using Tri-Form 60; and
 - (ii) specifies an alternative time by which a PCBU must ensure signs are removed, for the purposes of regulation 14.10(5)(b) of the Regulations, for fumigation using Tri-Form 60:
- (c) clause 7—
 - (i) modifies the signage requirements in regulation 14.10(1) of the Regulations (under regulation 14.10(4) of the Regulations) for fumigation using Ripper range; and
 - (ii) specifies an alternative time by which a PCBU must ensure signs are removed, for the purposes of regulation 14.10(5)(b) of the Regulations, for fumigation using Ripper range:
- (d) clause 8 modifies the notification requirements in regulation 14.7 of the Regulations (under regulation 14.7(4) of the Regulations) for quarantine or pre-shipment fumigation using methyl bromide:
- (e) clause 9 modifies the signage requirements in regulation 14.10(1) of the Regulations (under regulation 14.10(4) of the Regulations) for quarantine or pre-shipment fumigation using methyl bromide:
- (f) clause 10 modifies the notification requirements in regulation 14.7 of the Regulations (under regulation 14.7(4) of the Regulations) for soil fumigation for potato wart using methyl bromide:
- (g) clause 11 specifies an alternative time by which a PCBU must ensure signs are removed, for the purposes of regulation 14.10(5)(b) of the Regulations, for soil fumigation for potato wart using methyl bromide:
- (h) clause 12 requires AFE-HFP to comply with specified regulations:
- (i) clause 13 modifies the notification requirements in regulation 14.7(2) of the Regulations (under regulation 14.7(4) of the Regulations) for fumigation using AFE-HFP:
- (j) clause 14—
 - (i) modifies the signage requirements in regulation 14.10(1) of the Regulations (under regulation 14.10(4) of the Regulations) for fumigation using AFE-HFP; and
 - (ii) specifies an alternative time by which a PCBU must ensure signs are removed, for the purposes of regulation 14.10(5)(b) of the Regulations, for fumigation using AFE-HFP:
- (k) clause 15 specifies the maximum area of the application block, if AFE-HFP is applied, for the purposes of regulation 14.20(2)(c) of the Regulations:
- (l) clause 16 specifies requirements for the size of a buffer zone, for fumigation using AFE-HFP, under regulation 14.22(8) of the Regulations.

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- (m) Schedule 1 contains additional and modified requirements applying to the use of EDN.
 - (n) clause 18 modifies the soil condition requirements in regulation 14.26(2) of the Regulations (under regulation 14.26(3) of the Regulations) for fumigation using AFE-HFP:
 - (o) clause 19 requires Tri-Form 80 to comply with specified regulations:
 - (p) clause 20 modifies the notification requirements in regulation 14.7(2) of the Regulations (under regulation 14.7(4) of the Regulations) for fumigation using Tri-Form 80:
 - (q) clause 21—
 - (i) modifies the signage requirements in regulation 14.10(1) of the Regulations (under regulation 14.10(4) of the Regulations) for fumigation using Tri-Form 80; and
 - (ii) specifies an alternative time by which a PCBU must ensure signs are removed, for the purposes of regulation 14.10(5)(b) of the Regulations, for fumigation using Tri-Form 80:
 - (r) clause 22 specifies the maximum area of the application block, if Tri-Form 80 is applied, for the purposes of regulation 14.20(2)(c) of the Regulations:
 - (s) clause 23 specifies requirements for the size of a buffer zone, under regulation 14.22(8) of the Regulations, for fumigation using Tri-Form 80:
 - (t) clause 24 modifies the soil condition requirements in regulation 14.26(2) of the Regulations (under regulation 14.26(3) of the Regulations) for fumigation using Tri-Form 80:
 - (u) Schedule 2 specifies the minimum buffer zone distances required by clause 23 for fumigation using Tri-Form 80, according to the application rate.

4 Interpretation

- (1) In this safe work instrument, unless the context otherwise requires,—

Act means the Health and Safety at Work Act 2015

AFE-HFP means AFE-HFP, HSNO approval number HSR101251

EDN means ethanedinitrile, HSNO approval number HSR101529

Regulations means the Health and Safety at Work (Hazardous Substances) Regulations 2017

Ripper range has the meaning given the term **Ripper range (30-55% iodomethane and 45-70% chloropicrin)** in regulation 14.2 of the Regulations

site has the meaning given in regulation 14.32 of the Regulations, except for the purposes of Schedule 1 of this safe work instrument

Tri-Form 80 means Tri-Form 80, HSNO approval number HSR101451

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- (2) Any term or expression that is defined in the Act or the Regulations and used, but not defined, in this safe work instrument has the same meaning as in the Act or the Regulations.

Modified requirements applying to Tri-Form 60

5 Notification of intended fumigation – Tri-Form 60

- (1) This clause applies to a PCBU who intends to carry out fumigation using Tri-Form 60.
- (2) For the purposes of regulation 14.7(4) of the Regulations, regulation 14.7 applies as if the following subclause were inserted after subclause (3):
- "(3A) A PCBU who intends to carry out fumigation using Tri-Form 60 must also notify each person who may be affected by the fumigation who is normally present within 100 m from the outer edge of the buffer zone of the PCBU's intention to carry out fumigation not less than 24 hours before the start of the fumigation."

6 PCBU must erect signs – Tri-Form 60

- (1) This clause applies to a PCBU with management or control of fumigation using Tri-Form 60.
- (2) For the purposes of regulations 11 and 14.10(4) of the Regulations, regulation 14.10 applies as if subclause (1) were replaced with the following:
- "(1) A PCBU with management or control of fumigation of a type listed in regulation 14.9(a), (b)(ii) or (iii) or (iv), (e), (g), or (h) must erect signs at every point of entry to the buffer zone that—
- (a) can be readily seen by any person approaching the buffer zone; and
 - (b) state that fumigation is being carried out; and
 - (c) identify the fumigant being used and state that it is toxic to humans; and
 - (d) describe the general type of hazard associated with the fumigant; and
 - (e) if the fumigant is flammable, describe the precautions necessary to prevent unintended ignition of the fumigant."

(3) For the purposes of regulation 14.10(5)(b) of the Regulations, the PCBU with management or control of fumigation using Tri-Form 60 must ensure that signs are removed within 72 hours of the end of the buffer zone period.

Modified requirements applying to Ripper range

7 PCBU must erect signs – Ripper range

- (1) This clause applies to a PCBU with management or control of fumigation using Ripper range.
- (2) For the purposes of regulations 11 and 14.10(4) of the Regulations, regulation 14.10 applies as if subclause (1) were replaced with the following:

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- "(1) A PCBU with management or control of fumigation of a type listed in regulation 14.9(a), (b)(ii) or (iii) or (iv), (e), (g), or (h) must erect signs at every point of entry to the buffer zone that—
- (a) can be readily seen by any person approaching the buffer zone; and
 - (b) state that fumigation is being carried out; and
 - (c) identify the fumigant being used and state that it is toxic to humans; and
 - (d) describe the general type of hazard associated with the fumigant; and
 - (e) if the fumigant is flammable, describe the precautions necessary to prevent unintended ignition of the fumigant."
- (3) For the purposes of regulation 14.10(5)(b) of the Regulations, the PCBU with management or control of fumigation using Ripper range must ensure that signs are removed within 72 hours of the end of the buffer zone period.

Modified requirements applying to quarantine or pre-shipment fumigation using methyl bromide

8 Notification of intended fumigation – quarantine or pre-shipment fumigation using methyl bromide

- (1) This clause applies to a PCBU who intends to carry out quarantine or pre-shipment fumigation (other than soil fumigation for potato wart) using methyl bromide.
- (2) For the purposes of regulation 14.7(4), regulation 14.7 applies as if the following subclauses were inserted after subclause (3):
- "(3A) The PCBU who intends to carry out fumigation using methyl bromide at a site must notify the occupants of each property within 25 m of the site of the PCBU's intention to carry out fumigation not less than 24 hours before the start of the fumigation.
- (3B) If a marae is adjacent to a site, the PCBU who intends to carry out fumigation using methyl bromide must make appropriate notification arrangements with local Māori.
- (3C) A PCBU who intends to apply more than 100 kg of methyl bromide in a 24-hour period must notify the occupants of each property within 100 m of the site, including moored boats, of the PCBU's intention to carry out fumigation not less than 24 hours before applying the methyl bromide.
- (3D) The requirement to notify persons under subclauses (3A), (3B), and (3C) is treated as having been complied with if—
- (a) fumigation is carried out at the site weekly; and
 - (b) the relevant persons are notified of the intention to carry out regular fumigations at the site before the initial fumigation, and after that annually, by a notice setting out –
 - (i) where the fumigation will occur; and

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- (ii) the time at which ventilation will normally occur (if this can be specified); and
 - (iii) the expected frequency of the fumigation; and
 - (iv) any likely seasonal trends in the timing and scope of the fumigation.
- (3E) Subclauses (3A), (3B), and (3C) do not apply to fumigation when recapture technology is used.
- (3F) To avoid doubt, the notification requirements in subclauses (3A) to (3C) apply in addition to any applicable notification requirements in subclause (1) or (2)."

9 PCBU must erect signs – quarantine or pre-shipment fumigation using methyl bromide

- (1) This clause applies to a PCBU who intends to carry out quarantine or pre-shipment fumigation using methyl bromide (other than soil fumigation for potato wart).
- (2) For the purposes of regulation 14.10(4) of the Regulations, regulation 14.10 applies as if:
 - (a) subclause (1) were replaced with the following:

"(1) A PCBU with management or control of fumigation must erect signs in accordance with the following:

 - (a) if the fumigation is of a type listed in regulation 14.9(a) to (f) or (i), signs must be erected at every point of entry to the buffer zone, for those parts of a buffer zone that extend over land, that—
 - (i) state that fumigation is being carried out; and
 - (ii) identify the fumigant being used and state that it is toxic to humans; and
 - (iii) describe the general type of hazard associated with the fumigant; and
 - (iv) if the fumigant is flammable, describe the precautions necessary to prevent the unintended ignition of the fumigant:
 - (b) for fumigation of a type listed in regulation 14.9(a), (b)(ii) or (iii) or (iv), (e), (g), or (h), signs must be erected at every point of entry to the buffer zone, for those parts of a buffer zone that extend over land, that—
 - (i) can be readily seen by any person approaching the buffer zone; and
 - (ii) state that fumigation is being carried out; and
 - (iii) identify the fumigant being used and state that it is toxic to humans; and

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- (iv) describe the general type of hazard associated with the fumigant; and
- (v) if the fumigant is flammable, describe the precautions necessary to prevent unintended ignition of the fumigant."
- (b) subclause (3)(e) were amended by deleting "underground)." and substituting "underground); and":
- (c) the following were inserted as subclause (3)(f):
 - "(f) where the buffer zone extends over water, be able to be readily seen by any person approaching the buffer zone from a seaward direction at any time, including during the hours of darkness."

Modified requirements applying to soil fumigation for potato wart using methyl bromide

10 Notification of intended fumigation – soil fumigation for potato wart using methyl bromide

- (1) This clause applies to a PCBU who intends to carry out soil fumigation for potato wart using methyl bromide.
- (2) For the purposes of regulation 14.7(4) of the Regulations, regulation 14.7 applies as if the following subclause were inserted after subclause (3):
 - "(3A) A PCBU who intends to carry out soil fumigation for potato wart using methyl bromide must also ensure the following persons are notified in writing of the PCBU's intention to carry out fumigation not less than 48 hours before applying the methyl bromide:
 - (a) the medical officer of health:
 - (b) the PCBU with management or control of any place within 100 m of the site where the public is likely to be present and unable to readily evacuate (for example, a school, a playground, a child care facility, a prison, a hospital or a long-term care facility)."

11 PCBU must erect signs – soil fumigation for potato wart using methyl bromide

- (1) For the purposes of regulation 14.10(5)(b) of the Regulations, a PCBU with management or control of soil fumigation for potato wart using methyl bromide must ensure that signs are removed after the later of—
 - (a) 24 hours after the sheet is removed; and
 - (b) the time when the concentration of methyl bromide measured at 30 cm above the treated soil has been less than 0.05 ppm for a period of 15 minutes.

Requirements applying to AFE-HFP

12 AFE-HFP required to comply with specified regulations

- (1) AFE-HFP is required to comply with:

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- (a) regulation 14.4 of the Regulations under regulation 14.4(1)(c) of the Regulations:
 - (b) regulation 14.20 of the Regulations, under regulation 14.20(1)(c) of the Regulations:
 - (c) regulation 14.21 of the Regulations, under regulation 14.21(1)(c) of the Regulations:
 - (d) regulation 14.22 of the Regulations, under regulation 14.22(1)(c) of the Regulations:
 - (e) regulation 14.23 of the Regulations, under regulation 14.23(1)(c) of the Regulations:
 - (f) regulation 14.24 of the Regulations, under regulation 14.24(1)(c) of the Regulations:
 - (g) regulation 14.26 of the Regulations, under regulation 14.26(1)(b) of the Regulations:
 - (h) regulation 14.27 of the Regulations, under regulation 14.27(1)(b) of the Regulations.
- (2) To avoid doubt, subclause (1) applies in addition to any requirements under the Regulations that apply to, or in relation to, AFE-HFP.

13 Notification of intended fumigation – AFE-HFP

- (1) This clause applies to a PCBU who intends to carry out fumigation using AFE-HFP.
- (2) For the purposes of regulation 14.7(4) of the Regulations, regulation 14.7 applies as if the following subclause were inserted after subclause (3):
- "(3A) A PCBU who intends to carry out fumigation using AFE-HFP must also notify each person who may be affected by the fumigation who is normally present within 100 m from the outer edge of the buffer zone of the PCBU's intention to carry out fumigation not less than 24 hours before the start of the fumigation."

14 PCBU must erect signs – AFE-HFP

- (1) This clause applies to a PCBU with management or control of fumigation using AFE-HFP.
- (2) For the purposes of regulations 11 and 14.10(4) of the Regulations, regulation 14.10 applies as if subclause (1) were replaced with the following:
- "(1) A PCBU with management or control of fumigation of a type listed in regulation 14.9(a), (b)(ii) or (iii) or (iv), (e), (g), or (h) must erect signs at every point of entry to the buffer zone that—
- (a) can be readily seen by any person approaching the buffer zone; and
 - (b) state that fumigation is being carried out; and
 - (c) identify the fumigant being used and state that it is toxic to humans; and
 - (d) describe the general type of hazard associated with the fumigant; and

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- (e) if the fumigant is flammable, describe the precautions necessary to prevent unintended ignition of the fumigant.”
- (3) For the purposes of regulation 14.10(5)(b) of the Regulations, the PCBU with management or control of fumigation using AFE-HFP must ensure that signs are removed within 72 hours of the end of the buffer zone period.

15 Size of application block – AFE-HFP

For the purposes of regulation 14.20(2)(c) of the Regulations, a PCBU with management or control of fumigation using AFE-HFP must ensure that the application block is not more than 32 hectares.

16 PCBU to set buffer zones – AFE-HFP

For the purposes of regulation 14.22(8) of the Regulations, the requirements in subclauses (5) and (6) of regulation 14.22 and Table 3 in Schedule 18 of the Regulations apply to AFE-HFP as if references to Tri-Form 60 were references to AFE-HFP.

Additional and modified requirements applying to EDN

17 Additional and modified requirements applying to EDN

Schedule 1 specifies additional and modified requirements that apply to the use of EDN.

18 Soil condition requirements – AFE-HFP

For the purposes of regulations 11 and 14.26(3) of the Regulations, a PCBU with management or control of fumigation using AFE-HFP must ensure at the beginning of the application that—

- (a) the soil temperature at the depth of injection of AFE-HFP is a minimum of 5°C and does not exceed 27°C; and
- (b) the moisture content of the soil is—
- (i) equal to or more than 70% when measured with a tensiometer; or
- (ii) between 50–75% as defined by the USDA Feel and Appearance method.

Requirements applying to Tri-Form 80

19 Tri-Form 80 required to comply with specified regulations

- (1) Tri-Form 80 is required to comply with:
- (a) regulation 14.4 of the Regulations, under regulation 14.4(1)(c) of the Regulations:
- (b) regulation 14.20 of the Regulations, under regulation 14.20(1)(c) of the Regulations:
- (c) regulation 14.21 of the Regulations, under regulation 14.21(1)(c) of the Regulations:

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- (d) regulation 14.22 of the Regulations, under regulation 14.22(1)(c) of the Regulations:
 - (e) regulation 14.23 of the Regulations, under regulation 14.23(1)(c) of the Regulations:
 - (f) regulation 14.24 of the Regulations, under regulation 14.24(1)(c) of the Regulations:
 - (g) regulation 14.26 of the Regulations, under regulation 14.26(1)(b) of the Regulations:
 - (h) regulation 14.27 of the Regulations, under regulation 14.27(1)(b) of the Regulations:
- (2) To avoid doubt, subclause (1) applies in addition to any requirements under the Regulations that apply or relate to Tri-Form 80.

20 Notification of intended fumigation – Tri-Form 80

- (1) This clause applies to a PCBU who intends to carry out fumigation using Tri-Form 80.
- (2) For the purposes of regulations 11 and 14.7(4) of the Regulations, regulation 14.7 applies as if the following subclause were inserted after subclause (3):
- "(3A) A PCBU who intends to carry out fumigation using Tri-Form 80 must, not less than 24 hours before the start of the fumigation, also notify the PCBU's intention to carry out fumigation to each person who—
- (a) may be affected by the fumigation; and
 - (b) is normally present within 100 m from the outer edge of the buffer zone."

21 PCBU must erect signs – Tri-Form 80

- (1) This clause applies to a PCBU with management or control of fumigation using Tri-Form 80.
- (2) For the purposes of regulations 11 and 14.10(4) of the Regulations, regulation 14.10 applies as if subclause (1) were replaced with the following:
- "(1) A PCBU with management or control of fumigation of a type listed in regulation 14.9(a), (b)(ii) or (iii) or (iv), (e), (g), or (h) must erect signs at every point of entry to the buffer zone that—
- (a) can be readily seen by any person approaching the buffer zone; and
 - (b) state that fumigation is being carried out; and
 - (c) identify the fumigant being used and state that it is toxic to humans; and
 - (d) describe the general type of hazard associated with the fumigant; and
 - (e) if the fumigant is flammable, describe the precautions necessary to prevent unintended ignition of the fumigant."

(3) For the purposes of regulations 11 and 14.10(5)(b) of the Regulations, a PCBU with management or control of fumigation using Tri-Form 80 must ensure that signs are removed within 72 hours of the end of the buffer zone period.

22 Size of application block – Tri-Form 80

For the purposes of regulations 11 and 14.20(2)(c) of the Regulations, a PCBU with management or control of fumigation using Tri-Form 80 must ensure that the application block is not more than 32 hectares.

23 PCBU to set buffer zones – Tri-Form 80

- (1) For the purposes of regulations 11 and 14.22(8) of the Regulations, a PCBU with management or control of fumigation using Tri-Form 80 must ensure that the buffer zone extends at least to the relevant distance specified in the table in Schedule 2 unless reduced in accordance with subclauses (2) and (3).
- (2) The distances in the table in Schedule 2 may be reduced up to a maximum reduction of 80% for a particular buffer zone, in accordance with table 5 in Schedule 18 of the Regulations, if highly retentive film is used and the fumigant is applied to specific soil types.
- (3) Despite subclause (2), a buffer zone must in all cases be not less than 8 m.

24 Soil condition requirements – Tri-Form 80

For the purposes of regulations 11 and 14.26(3) of the Regulations, a PCBU with management or control of fumigation using Tri-Form 80 must ensure at the beginning of the application that—

- (a) the soil temperature at the depth of injection of Tri-Form 80 is a minimum of 5°C and does not exceed 27°C; and
- (b) the moisture content of the soil is—
 - (i) equal to or more than 70% when measured with a tensiometer; or
 - (ii) between 50–75% as defined by the USDA Feel and Appearance method.

Schedule 1

Additional and modified requirements for EDN

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Preliminary provisions

1 Overview

This schedule contains the following additional and modified requirements applying to the use of EDN:

- (a) clause 3 sets out additional requirements to be complied with under regulation 13.46(7) of the Regulations in relation to the purposes for which EDN may be used:
- (b) clause 4 modifies the notification requirements in regulation 14.7 of the Regulations for intended fumigations using EDN:

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- (c) clause 5 modifies the signage requirements in regulation 14.10(1) of the Regulations for fumigation using EDN:
- (d) clauses 6 and 7 set out additional requirements to be complied with under regulation 13.46(7) of the Regulations in relation to setting buffer zones and restricting entry to them when carrying out fumigation using EDN:
- (e) clause 8 sets out additional requirements to be complied with under regulation 13.46(7) of the Regulations to—
 - (i) determine the affected area when carrying out fumigation using EDN; and
 - (ii) restrict entry to that area to workers carrying out fumigation-related work:
- (f) clause 9 sets out additional requirements to be complied with under regulation 13.46(7) of the Regulations when applying EDN:
- (g) clause 10 sets out additional requirements to be complied with under regulation 13.46(7) of the Regulations to measure wind speed and direction when carrying out fumigation using EDN:
- (h) clause 11 modifies the ventilation and safety requirements in regulation 14.16 of the Regulations for fumigation using EDN:
- (i) clause 12 modifies the tolerable exposure limit requirements in regulation 13.17 of the Regulations for fumigation using EDN:
- (j) clause 13 sets out additional requirements to be complied with under regulation 13.46(6)(a) of the Regulations when recorded exposure levels exceed the tolerable exposure limit for EDN:
- (k) clause 14 prescribes the workplace exposure standards for EDN under regulation 13.18(3) of the Regulations:
- (l) clause 15 modifies the record-keeping requirements in regulation 14.18(1) of the Regulations for fumigation using EDN:
- (m) clause 16 sets out an additional requirement to be complied with under regulation 13.46(7) of the Regulations to keep a record of every unintentional release of EDN:
- (n) clause 17 sets out additional requirements to be complied with under regulation 13.46(7) of the Regulations to produce an annual report of fumigations using EDN.

2 Interpretation

In this schedule, unless the context otherwise requires,—

affected area means—

- (a) an area within which one or more workplace exposure standards for EDN is or may be exceeded during fumigation and ventilation; and
- (b) includes an enclosed space

buffer zone means an area extending outward in all directions from the perimeter of an enclosed space being fumigated to a distance of at least 50 metres

buffer zone period means the period that starts when EDN is first applied in an enclosed space and ends with the latest of the following:

- (a) at least 1 hour has lapsed since ventilation has been completed;
- (b) measurements taken in the open air adjacent to the export logs or timber being fumigated in the enclosed space have, for a period of 15 minutes, continuously shown an airborne concentration of EDN below that of each workplace exposure standard

enclosed space means:

- (a) the space under a sheet;
- (b) a shipping container

exposure level means the concentration of EDN in the air recorded at the monitoring location

fumigation-related work means all work associated with fumigation using EDN

location, in relation to fumigation using EDN at any site, means the place on the site—

- (a) where the fumigation is occurring; and
- (b) which is recorded using—
 - (i) New Zealand Mapping Series grid references; or
 - (ii) a map with a resolution of at least 1:10 000; or
 - (iii) New Zealand Transverse Mercator (NZTM) 2000 coordinates

monitoring location, in relation to a buffer zone, means the point on land at the edge of the buffer zone that is in the most downwind direction from the enclosed space being ventilated

Regulations means the Health and Safety at Work (Hazardous Substances) Regulations 2017

sheet means a heavy-duty cover that—

- (a) has a low mass transfer coefficient for EDN; and
- (b) is waterproof and impenetrable

site, in relation to the use of EDN on land, means an area of land within a workplace where EDN is used and (regardless of whether the area is bisected by a road or right of way) that—

- (a) consists of—
 - (i) a single allotment or other legally defined parcel of land that is the smaller of—
 - (A) an allotment or parcel held in a single certificate of title;
 - (B) an allotment or parcel for which a separate certificate of title could be issued without the further consent of the relevant local authority; or
 - (ii) 2 or more adjoining legally defined parcels of land held together in 1

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- certificate of title in such a way that the lots cannot be dealt with separately without the further consent of the relevant local authority; or
- (iii) 2 or more adjoining certificates of title that are—
- (A) subject to a condition imposed under section 37 of the Building Act 2004 or section 240 of the Resource Management Act 1991; or
- (B) held together in such a way that they cannot be dealt with separately without the further consent of the relevant local authority; and
- (b) contains—
- (i) for land subdivided under the cross lease or company lease systems (other than strata titles),—
- (A) a building or buildings used for residential or business purposes with any accessory building, plus any land exclusively restricted to the users of that building; or
- (B) a remaining share or shares in the fee simple creating a vacant part of the whole for future cross lease or company lease purposes; and
- (ii) for land subdivided under the Unit Titles Act 2010 (other than strata titles), a principal unit or proposed unit on a unit plan together with its accessory units, and includes—
- (A) for strata titles, an area of land comprised in underlying certificate of titles, immediately before subdivision; and
- (B) an activity that occupies more than 1 adjoining allotment, whether held in single legal title or multiple titles, and for the purpose of compliance with any rules that specify a level of effect at the boundary or that specify capacities or discharge quantities, the total area of land occupied by that activity, the boundary of which is the boundary around that area of land

tolerable exposure limit in relation to EDN, means the limit as set by the Environmental Protection Authority under section 77B of the Hazardous Substances and New Organisms Act 1996

ventilate means the intentional release of EDN into the atmosphere following fumigation, and **ventilation** has a corresponding meaning.

Additional requirement restricting use of EDN

3 Purpose for which EDN may be used

For the purposes of regulation 13.46(4)(a) of the Regulations, a PCBU with management or control of EDN must ensure that the substance is used—

- (a) only for the purpose of carrying out the fumigation of export logs or timber (or both)—
- (i) either—
- (A) under a sheet; or

- (B) in a shipping container; and
- (ii) in accordance with clause 9; and
- (b) for no other purpose.

Additional and modified notification and signage requirements

4 Notification of intended fumigation

For the purposes of regulations 11 and 14.7(4) of the Regulations, regulation 14.7 applies as if the following subclauses were inserted after subclause (3):

“(3A) A PCBU who intends to carry out the fumigation of export logs or timber using EDN must notify the following persons of the PCBU’s intention to carry out the fumigation:

- (a) every PCBU whose workers carry out work in the buffer zone; and
- (b) if a marae is adjacent to the site, local Māori; and
- (c) if more than 100 kg of EDN is to be applied in a 24-hour period, the occupier of every other property (including moored boats) within 100 m of the site.

(3B) A PCBU who is required to notify local Māori under subclause (3A)(b) must develop appropriate notification arrangements in consultation with local Māori.

(3C) Subject to the notification arrangements developed under subclause (3B), a PCBU who is required to give a notification under subclause (3A) must ensure that it is given not less than 24 hours before the start of the fumigation.

(3D) The requirement under subclause (3A) to notify a person is treated as having been complied with if—

- (a) fumigation is carried out at the site every week; and
- (b) subject to the notification arrangements developed under subclause (3B), the PCBU with management or control of the fumigations—
 - (i) gives notice to the person of the intention to carry out fumigations at the site not less than 24 hours before the first of the fumigations begins and annually thereafter; and
 - (ii) includes in the notice the following information:
 - (A) where the fumigation will occur; and
 - (B) to the extent it can be specified, the time ventilation will normally occur; and
 - (C) the expected frequency of the fumigation; and
 - (D) any likely seasonal variations to the timing and scope of the fumigation.

(3E) To avoid doubt, the notification requirements in subclause (3A) apply in addition to any applicable notification requirements in subclause (1) or (2).”

5 PCBU must erect signs

For the purposes of regulations 11 and 14.10(4) of the Regulations, regulation 14.10 applies as if subclause (1) were replaced with the following:

"(1) A PCBU with management or control of fumigation using EDN must, at each point of entry to the buffer zone on land, erect signs that—

- (a) can be readily seen by any person approaching the buffer zone; and
- (b) to the extent the buffer zone extends over water, are clearly visible and legible to any person approaching the buffer zone from a seaward direction at any time, including during the hours of darkness; and
- (c) state that fumigation is being carried out; and
- (d) identify that EDN is being used and state that it is toxic to humans; and
- (e) describe the general type of hazard associated with EDN; and
- (f) describe the precautions necessary to prevent the unintended ignition of EDN; and
- (g) state that access by members of the public is prohibited."

Additional and modified operational requirements

6 PCBU to set buffer zone for fumigation using EDN

For the purposes of regulation 13.46(4)(a) of the Regulations, a PCBU with management or control of EDN that the PCBU uses for fumigation must set a buffer zone around the perimeter of each enclosed space for each fumigation.

7 Entry to buffer zone to be restricted

- (1) For the purposes of regulation 13.46(4)(a) of the Regulations, a PCBU with management or control of EDN that the PCBU uses for fumigation must ensure that no member of the public is in the buffer zone during the buffer zone period.
- (2) Despite subclause (1), if a buffer zone extends over water, the PCBU must ensure so far as reasonably practicable that—
 - (a) the buffer zone is kept under observation; and
 - (b) if a member of the public enters the buffer zone, the member of the public moves out of the buffer zone as soon as is reasonably practicable.

8 Entry to affected area to be restricted

For the purposes of regulation 13.46(4)(a) of the Regulations, a PCBU with management or control of EDN that the PCBU uses for fumigation must—

- (a) for each fumigation, determine, review and, if necessary, adjust the affected area having regard to—
 - (i) the particular circumstances of the fumigation; and
 - (ii) information obtained from monitoring data; and

- (b) ensure that—
 - (i) no person enters or remains in the affected area at any time, other than in the following circumstances:
 - (A) the certified handler referred to in regulation 14.16(2)(a)(i) of the Regulations (as modified by clause 11) is satisfied that the affected area is safe for the person to enter;
 - (B) the person is a worker carrying out fumigation-related work; and
 - (ii) no worker carrying out fumigation-related work enters or remains in the affected area unless—
 - (A) the worker wears personal protective equipment in accordance with regulation 13.8 of the Regulations; and
 - (B) the personal protective equipment is suitable to ensure the worker is not exposed to levels of EDN above the workplace exposure standards.

9 Application of EDN

- (1) For the purposes of regulation 13.46(4)(a) of the Regulations, a PCBU with management or control of EDN that the PCBU uses for fumigation must ensure that—
 - (a) if fumigation using EDN is carried out under a sheet,—
 - (i) each sheet under which the EDN is applied is—
 - (A) in good repair and has no tears, rips, or visible holes; and
 - (B) made secure against likely weather conditions at the site; and
 - (C) sealed; and
 - (ii) the floor of the enclosed space is flat and impermeable to EDN; and
 - (b) each fumigation is continuously monitored by sampling tubes that—
 - (i) allow concentrations of EDN in the enclosed space to be measured; and
 - (ii) allow changes to be detected in the concentration of EDN that may indicate an unintentional release of EDN from the enclosed space; and
 - (iii) are placed—
 - (A) in accordance with subclauses (2) and (3); and
 - (B) as far from fumigant supply pipes as possible; and
 - (iv) are equipped with meters that allow readings to be taken from outside the affected area; and
 - (c) if an unintentional release of EDN into the open air occurs, steps are taken as soon as possible to—
 - (i) stop the unintentional release and prevent a recurrence; and
 - (ii) eliminate or minimise the risk to health and safety, so far as is reasonably practicable.

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- (2) If the fumigation is carried out on a stack of export logs or timber in an enclosed space that is 30 m³ or smaller, the PCBU must ensure that—
- (a) the fumigation is continuously monitored; and
 - (b) the monitoring is carried out within the enclosed space using one or more sampling tubes, one of which is placed on top of the stack of export logs or timber and positioned at the centre.
- (3) If the fumigation is carried out on a stack of export logs or timber in an enclosed space that is larger than 30 m³, the PCBU must ensure that—
- (a) the fumigation is continuously monitored; and
 - (b) the monitoring is carried out within the enclosed space using three or more sampling tubes; and
 - (c) the placement of the sampling tubes within the enclosed space meets the following requirements:
 - (i) in every case,—
 - (A) one sampling tube must be placed within the stack of export logs or timber as close to the centre as possible; and
 - (B) one sampling tube must be placed in front of the stack of export logs or timber and positioned at the base:
 - (ii) in the case of fumigation carried out under a sheet, one sampling tube must also be placed on top of the stack of export logs or timber and positioned at the centre:
 - (iii) in the case of fumigation carried out in a shipping container, each sampling tube must be placed as far from the doors of the shipping container as possible.

10 PCBU to measure wind speed and direction

For the purposes of regulation 13.46(4)(a) of the Regulations, a PCBU with management or control of EDN that the PCBU uses for fumigation must ensure that the wind speed and direction is measured at the site every 3 minutes during the buffer zone period at the following times:

- (a) when EDN is being applied;
- (b) when the enclosed space is being ventilated until the end of the buffer zone period;
- (c) when an unintentional release of EDN occurs until—
 - (i) the unintentional release has been stopped; and
 - (ii) measurements taken in the open air adjacent to the export logs or timber being fumigated in the enclosed space have, for a period of 15 minutes, continuously shown an airborne concentration of EDN that is below each workplace exposure standard.

11 Ventilation requirements

For the purposes of regulations 11 and 14.16(3) of the Regulations, regulation 14.16 applies as if subclause (2) were replaced with the following:

- "(2) A PCBU with management or control of fumigation using EDN must—
- (a) ensure, so far as is reasonably practicable, that the enclosed space is properly ventilated so that, at the completion of fumigation,—
 - (i) in the opinion of a certified handler, the EDN has dispersed from all parts of the enclosed space; and
 - (ii) the maximum concentration of EDN that is in the affected area is reduced to the lower of the following:
 - (A) the maximum level of exposure permitted in the prescribed exposure standards set in relation to EDN;
 - (B) the lowest level practicable; and
 - (b) ensure that—
 - (i) ventilation is carried out only during the hours between sunrise and sunset; and
 - (ii) ventilation does not begin until the concentration of EDN in the enclosed space is 700 ppm or less; and
 - (iii) the airborne concentration of EDN is measured during ventilation until the end of the buffer zone period—
 - (A) in the open air adjacent to the export logs or timber; and
 - (B) at the monitoring location; and
 - (iv) the fumigated export logs or timber are not moved until the end of the buffer zone period."

Exposure standards and limits

12 Modified requirement for tolerable exposure limit

For the purposes of regulation 13.46(4)(b) of the Regulations, regulation 13.17 applies as if subclause (1) were replaced with the following:

- "(1) A PCBU with management or control of work using a class 6 substance must ensure that it is not used in a manner that results in—
- (a) in the case of fumigation using EDN, a concentration of the substance in the air at any point on the boundary of the buffer zone that exceeds the tolerable exposure limit set for that medium; and
 - (b) in every other case, a concentration of the substance in an environmental medium that exceeds the tolerable exposure limit set for the medium."

13 Additional requirement to notify recorded exposure level

For the purposes of regulation 13.46(4)(a) of the Regulations, if the exposure level recorded for a ventilation exceeds the tolerable exposure limit for EDN, the PCBU must notify WorkSafe and the relevant medical officer of health as soon as practicable but within 5 working days of the exposure level being recorded.

14 Workplace exposure standards prescribed for EDN

For the purposes of regulations 11 and 13.18(3) of the Regulations, the workplace exposure standards for EDN are:

- (a) an average airborne concentration of 3 ppm (6.4 mg/m³) calculated over an 8 hour work period;
- (b) a maximum airborne concentration of 5 ppm (10.6 mg/m³) at any time during that work period.

Additional and modified record-keeping and reporting requirements

15 Requirement to keep a record of application of EDN

- (1) For the purposes of regulations 11 and 14.18(2) of the Regulations, regulation 14.18 applies as if subclause (1) were replaced with the following:

"(1) A PCBU with management or control of fumigation using EDN must ensure that an accurate written record of each application of EDN is kept in accordance with regulation 13.4 and subclause (1A).

(1A) In addition to the information specified in regulation 13.4(1), the PCBU must ensure that for each fumigation the following data is included in the written record:

- (a) a description of the affected area, including any adjustment to the affected area during fumigation; and
- (b) the volume of export logs or timber in the enclosed space;
- (c) the measurements of wind speed and direction taken in accordance with clause 10(a) and (b);
- (d) a description of the data collected from monitoring in the enclosed space, including end concentrations of EDN;
- (e) the date, time and location of each ventilation;
- (f) buffer zone information for the monitoring location;
- (g) the time the fumigated export logs or timber were removed from the location where the EDN was applied.

(1B) For the purposes of subclause (1A), **buffer zone information** means—

- (a) exposure levels for EDN, including the 24-hour exposure level for each ventilation;
- (b) the number of times exposure levels exceeded the tolerable exposure limit for EDN:

- (c) the risk mitigation measures taken each time the tolerable exposure limit for EDN was exceeded;
 - (d) the type and location of monitoring equipment used to record exposure levels."
- (2) For the purposes of regulation 13.46(4)(b) of the Regulations, regulation 14.18 applies as if subclause (3) were replaced with the following:
- "(3) The PCBU must ensure that the written record is—
- (a) kept for at least 7 years after the date of the fumigation to which it relates; and
 - (b) available for inspection during that time."

16 Requirement to keep a record of unintentional release

- (1) For the purposes of regulation 13.46(4)(a) of the Regulations, a PCBU with management or control of EDN that the PCBU uses for fumigation must ensure that—
- (a) an accurate written record of each unintentional release of EDN into the open air that occurs during fumigation is kept; and
 - (b) the written record contains the following information:
 - (i) the volume of export logs or timber in the fumigation area;
 - (ii) the date and time of the unintentional release;
 - (iii) the approximate amount of EDN unintentionally released;
 - (iv) the location where EDN was unintentionally released;
 - (v) the approximate wind speed and direction at the location when the unintentional release began;
 - (vi) the measurements of wind speed and direction taken in accordance with clause 10(c);
 - (vii) where the unintentional release occurred from;
 - (viii) the reason why the unintentional release occurred;
 - (ix) the name of each worker carrying out fumigation-related work at the time of the unintentional release and the physical address of the worker's workplace;
 - (x) all actions taken at the time to manage the risks associated with the unintentional release;
 - (xi) all actions taken to prevent future unintentional releases; and
 - (c) the written record is—
 - (i) kept for at least 7 years after the date of the fumigation to which it relates; and
 - (ii) available for inspection during that time.
- (2) For the purposes of subclause (1), a **written record** includes a record made by electronic means.

17 Requirement to produce annual monitoring report

- (1) For the purposes of regulation 13.46(4)(a) of the Regulations, a PCBU with management or control of EDN must—
 - (a) produce an annual monitoring report for each site at which the PCBU uses EDN for fumigation; and
 - (b) ensure the annual monitoring report contains the information set out in subclause (2); and
 - (c) provide the annual monitoring report to WorkSafe and the relevant medical officer of health by 31 March of the year following the calendar year to which the report relates.
- (2) The annual monitoring report must contain the following information for each calendar year:
 - (a) the number of fumigations using EDN carried out at the site:
 - (b) the total amount of EDN applied at the site:
 - (c) the types of equipment used to monitor the fumigations:
 - (d) the number of times an unintentional release of EDN into the open air occurred:
 - (e) the approximate total quantity of EDN unintentionally released:
 - (f) the number of notifications made in accordance with clause 13, identified by each monitoring location:
 - (g) how worker exposure is managed at the site:
 - (h) an anonymised summary of health monitoring results for workers carrying out fumigation-related work, including at least 2 results for every worker who has been carrying out fumigation-related work for a period of 12 months or more:
 - (i) any accidents or issues related to non-compliance with any of the applicable requirements in the Regulations or this schedule.

Schedule 2

Buffer zone distances for Tri-Form 80

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The following table states the minimum distance (in metres) between the perimeter of the application block and any point of the perimeter of the buffer zone for all applications. In this table, BEAR means broadcast equivalent application rate (kg Tri-Form 80/ha).

BEAR	Application block size (ha)																		
	1	2	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	
< 82	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
82	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	9
90	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	9
100	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	9
130	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	9
142	8	8	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9
149	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9	9	9
157	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9	10	10
164	8	8	8	8	8	8	8	8	8	8	8	9	9	9	10	10	10	10	11
172	8	8	8	8	8	8	8	8	8	8	8	9	9	9	10	10	11	11	12
180	8	8	8	8	8	8	8	8	8	8	8	10	11	12	12	14	14	14	16
187	8	8	8	8	8	8	8	9	9	9	11	13	15	17	18	19	20	21	21
194	8	8	8	8	8	8	9	11	11	12	15	19	19	20	21	22	23	24	24
202	8	8	8	8	8	9	10	11	12	13	16	21	21	21	22	23	24	25	25
210	8	8	8	8	8	10	11	12	14	16	19	22	22	24	25	27	28	29	29
217	8	8	8	8	8	11	12	13	16	19	21	23	25	27	28	30	32	34	34
224	8	8	8	8	8	13	13	14	18	21	23	24	27	30	32	34	36	38	38
232	8	8	8	8	9	13	14	16	19	23	25	27	30	33	35	37	39	41	41
239	8	8	8	9	12	13	16	17	20	27	29	32	35	37	39	41	44	46	46
246	8	8	8	10	14	17	20	25	28	31	33	36	39	42	44	46	48	51	51
254	8	8	8	12	17	21	22	28	29	36	38	41	43	46	48	51	52	53	53
260	8	8	8	14	20	23	26	31	36	40	43	45	47	51	53	54	55	56	56
269	8	8	8	16	23	26	28	34	39	42	45	48	50	53	55	56	57	58	58
276	8	8	9	19	26	29	31	37	43	46	49	52	55	57	60	63	64	64	64
284	8	8	10	21	29	32	34	41	48	51	53	56	59	61	64	68	69	69	69
292	8	9	12	23	32	35	37	45	52	55	58	60	63	66	69	73	74	75	75
300	9	9	12	23	32	36	39	47	53	56	59	61	64	67	71	75	77	78	78
306	9	9	12	23	32	37	43	49	55	58	60	63	66	69	74	78	80	81	81
314	9	10	12	23	34	40	43	51	57	59	62	65	68	71	75	80	82	84	84

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BEAR	Application block size (ha)																	
	1	2	3	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
321	9	10	12	23	34	44	47	53	59	61	64	67	70	73	78	82	84	87
329	9	10	12	23	34	48	51	55	60	62	66	69	72	75	80	84	86	90
336	10	11	13	23	35	48	51	57	62	64	68	71	74	77	82	87	89	93
344	10	11	13	28	35	51	53	59	64	66	70	73	76	79	85	90	92	96
351	10	11	13	28	35	51	53	61	66	68	72	75	78	81	87	93	95	99
358	11	12	14	28	35	55	57	63	68	70	74	77	80	83	90	96	98	102
366	11	12	14	28	35	55	57	65	70	72	76	79	82	85	92	99	101	105
373	11	12	14	28	35	57	59	67	72	74	78	81	84	87	95	102	104	108
381	12	13	15	28	35	57	59	69	74	76	80	83	86	89	97	105	107	111
388	12	13	15	28	35	57	59	71	76	78	82	85	88	91	100	108	110	114
396	12	13	15	28	35	57	59	73	78	80	84	87	90	93	102	111	113	117
404	12	13	15	28	37	60	62	75	80	82	86	89	92	95	104	114	116	120
411	13	14	16	28	37	60	62	77	82	84	88	91	94	97	106	116	119	124
418	13	14	16	32	39	60	62	79	84	86	90	93	96	99	108	117	122	128
426	13	14	16	32	39	62	64	81	86	88	92	95	98	101	110	119	124	131
433	13	14	16	32	39	62	64	83	88	90	94	97	101	104	112	121	127	134
441	14	15	17	32	39	64	66	85	90	92	96	99	104	107	115	123	130	137
448	14	15	17	32	39	64	66	87	92	94	98	101	107	111	118	125	133	140
456	14	15	17	35	42	65	67	89	94	96	100	103	110	115	121	127	136	143
463	15	16	18	35	42	65	67	91	96	98	104	108	113	117	123	129	139	145
471	15	16	18	35	42	66	68	93	98	102	108	112	116	119	125	131	142	147
478	16	17	18	35	42	68	70	95	100	105	112	116	119	122	127	132	145	148
485	16	18	18	37	44	70	74	97	102	110	116	120	123	126	129	133	148	150
493	17	18	19	37	44	71	76	99	106	115	118	123	124	129	131	135	150	152
500	17	18	19	38	45	73	90	106	112	118	120	126	127	132	134	136	152	154
507	17	18	19	39	46	74	91	107	113	120	126	127	132	134	136	144	154	156
514	18	20	25	43	54	84	107	113	120	126	129	132	134	136	144	154	156	158
521	18	25	35	55	75	91	107	120	125	129	132	134	136	144	154	156	158	160
529	19	25	45	75	107	116	120	125	129	132	134	136	144	154	156	158	160	164
536	20	45	75	107	113	118	125	129	132	134	136	144	154	156	158	160	164	167
543	25	53	85	113	119	123	127	132	134	136	144	154	156	158	160	164	167	171
550	30	60	95	115	120	126	132	134	136	144	154	156	158	160	165	167	171	175

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