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***Nufarm Australia Limited v Dow AgroSciences, LLC* [2020] APO 10**

Patent Applications:	2016202508 & 2016203677
Title:	Compounds derived from herbicidal carboxylic acids and tetraalkylammonium or (arylalkyl) trialkylammonium hydroxides
Patent Applicant:	Dow AgroSciences, LLC
Opponent:	Nufarm Australia Limited
Delegate:	Dr S. J. Smith
Decision Date:	31 January 2020
Hearing Date:	14 August 2019, in Melbourne
Catchwords:	**PATENTS** – opposition to the grant of patents – novelty – product-by-process claims – some claims not novel – inventive step – the problem to be solved – common general knowledge – evidence does not establish that a person would be led to the claimed solution – utility – promise of the invention – claims do not lack utility – support – contribution to the art – claims are supported – consideration of variation of costs
Representation:	Counsel for the applicant: Craig Smith Patent attorney for the applicant: Karen Bentley and Emma van Embden of FPA Patent Attorneys Counsel for the opponent: Benjamin Fitzpatrick Patent attorney for the opponent: Virginia Beniac-Brooks of Arcadia Intellectual Property

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Patent Application:	2016202508 & 2016203677
Title:	Compounds derived from herbicidal carboxylic acids and tetraalkylammonium or (arylalkyl) trialkylammonium hydroxides
Patent Applicant:	Dow AgroSciences, LLC
Date of Decision:	31January 2020

DECISION

2016202508

The opposition is unsuccessful. Subject to appeal I direct that the application proceed to grant.

2016203677

Claims 1-3, 6, 8 and 12 are not novel.

Dow Agrosciences, LLC is allowed a period of two months from the date of this decision to propose amendments to overcome this deficiency.

I award costs according to Schedule 8 against Dow AgroSciences, LLC.

REASONS FOR DECISION

1. Background

1. Patent applications 2016202508 (the **508 application**) and 2016203677 (the **677 application**) were filed on 20 April 2016 and 2 June 2016, respectively, by Dow AgroSciences, LLC (**Dow**). The applications are third generation divisional applications each descended from parent application 2015200368, grandparent application 2013203406 and great-grandparent application 2008219657. Application 2008219657 claims priority from US 60/903,417, which was filed on 26 February 2007. The entitlement of the present applications to this priority date was not challenged at the hearing.

2. Acceptance of the 508 application was advertised on 31 August 2017. Acceptance of the 677 application was advertised on 20 July 2017. Nufarm Australia Limited (**Nufarm**) filed notices of opposition under section 59 of the *Patents Act 1990* (the ***Act***) to the applications on 30 November 2017 and 20 October 2017, respectively.

3. Both applications are broadly directed to the reaction product of a herbicidal carboxylic acid and a tetraalkylammonium hydroxide and use thereof as a herbicide, and the oppositions to the applications were heard together on 14 August 2019 in Melbourne.

4. Dow proposed post-acceptance amendments to the 508 specification on 21 August 2018 which were allowed unopposed on 14 November 2018. This decision is in relation to the specification as amended.

5. The statement of grounds and particulars in relation to the 508 application was filed on 28 February 2018 and identifies the following grounds of opposition: manner of manufacture, novelty, inventive step, utility, clear enough and complete enough disclosure, best method, lack of definition, support and clarity and succinctness. At the hearing grounds of novelty, inventive step, utility and support were pressed.

6. The evidence filed during the evidentiary periods for the opposition to the 508 application is summarised in the table below:

Evidence	**Declarant**	**Exhibits**	**Date of declaration**	**Reference**
In Support	Phillip Maxwell Hay	PMH-1 to PMH-31	28 May 2018	**Hay 1.1**
In Answer	David G Ouse	DGO-1 to DGO-4	27 August 2018	**Ouse 1**
	Norman R Pearson	NRP-1 to NRP-4	23 August 2018	**Pearson**
	Terry R Wright	TRW-1 to TRW-14	23 August 2018	**Wright 1**
In Reply	Jason Daniel McKerrow	JDM-1 to JDM-3	14 September 2018	**McKerrow 1**
	Phillip Maxwell Hay	PMH-32 to PMH-36	29 October 2018	**Hay 1.2**

7. The statement of grounds and particulars in relation to the 677 application was filed on 22 January 2018 and an amendment to the statement was allowed on 12 February 2019. The statement identifies the following grounds of opposition: manner of manufacture, novelty, inventive step, utility, clear enough and complete enough disclosure, best method, lack of definition, support and clarity and succinctness. At the hearing grounds of novelty, inventive step, utility and support were pressed.

8. The evidence filed during the evidentiary periods for the opposition to the 677 application is summarised in the table below:

Evidence	Declarant	Exhibits	Date of declaration	Reference
In Support	Phillip Maxwell Hay	PMH-1 to PMH-27	23 April 2018	**Hay 2.1**
In Answer	David G Ouse	DGO-1 to DGO-4	20 July 2018	**Ouse 2**
	Terry R Wright	TRW-1 to TRW-12	22 July 2018	**Wright 2**
In Reply	Jason Daniel McKerrow	JDM-1 to JDM-3	14 September 2018	**McKerrow 2**
	Phillip Maxwell Hay	PMH-28 to PMH-31	20 September 2018	**Hay 2.2**

9. Pursuant to directions made on 28 February 2018 and 22 January 2018, respectively, the documents filed with the statements of grounds and particulars for the oppositions to the 508 and 677 applications are also treated as evidence in support in the oppositions.

10. Amendments brought about by the *Intellectual Property Laws Amendment (Raising the Bar) Act 2012* (the ***Raising the Bar Act***) apply to these applications as they were filed after its commencement. This includes section 60(3A) of the *Act*, which provides that the Commissioner may refuse an application if satisfied on the balance of probabilities that a ground of opposition exists. It is the opponent who carries the onus of proof.

11. The description of each specification is materially the same, and so I will at the outset discuss the disclosure and the relevant skilled person with respect to both applications.

2. The person skilled in the art

12. It is well established that many of the issues in an opposition are answered by reference to the person skilled in the art:

> "He is the person to whom the patent is addressed and who must construe it. He is the person whose knowledge will determine whether a patent is novel. He is the person who will judge whether a patent is obvious."[1]

13. The hypothetical skilled person works in the field with which the invention is connected and is a non-inventive person or team likely to have a practical interest in the subject matter of the invention.[2] The specification is directed to the reaction product of a herbicidal carboxylic acid and a tetraalkylammonium hydroxide and use thereof as a herbicide. Accordingly, the skilled person, or team, would be expected to have a practical interest in the field of herbicides, including the development, manufacture and use of herbicidal agents. The key declarants in this matter are Mr Hay for Nufarm and Mr Ouse, Dr Pearson and Dr Wright for Dow. Dr McKerrow performed experiments at the request of Mr Hay.

14. Mr Hay is a long term employee of Nufarm with experience in formulating new agricultural chemicals. Mr Hay's work involved development of formulations including 2,4-

[1] *Root Quality Pty Ltd v Root Control Technologies Pty Ltd* [2000] FCA 980 at [70].
[2] Ibid at [70]-[72].

dichlorophenxoyacetic acid (**2,4-D**), and in 2005 and 2006 he was, on behalf of Nufarm, involved in the APVMA's assessment of the risks associated with all forms of 2,4-D, and between 2006 and 2013 coordinated Nufarm's technical response to the APVMA 2006 Preliminary Review Findings requiring the suspension of high volatile esters of 2,4-D.[3]

15. Mr Ouse, a named inventor of the applications, is a research biologist at Dow with research experience in agronomy and herbicide science.[4] Dr Pearson is a patent liaison at Dow and a named inventor of the applications. His experience includes research in early stage formulation innovation and synthesis of novel agrochemical active ingredients.[5] Dr Wright is a research fellow at Dow and has research experience in agronomy, pesticide science and plant biotechnology, including field testing herbicides from discovery to commercial product development and launch, and discovery of new herbicides.[6]

16. I note that each declarant has an affiliation with the party on whose behalf they have provided evidence. I also note Dow's submission that Mr Hay was not unaware of the present applications prior to making his declarations, noting that he makes no statement to that effect, and had previously made a declaration in relation to related application 2008219657. Dow submitted that this significantly reduces the weight that can be placed on his evidence.[7]

17. I am satisfied that each of the declarants have backgrounds that enable them to understand the specification and provide evidence as to what a person skilled in the art knew or would have done at the relevant date. Where there is conflicting evidence I will decide which evidence to give greater weight.

3. The specifications

18. Before construing the specification, I note the comments of Middleton J in *Eli Lilly and Company Limited v Apotex Pty Ltd*:

> "It is well settled that the Court should, from the outset, approach the task of patent construction with a generous measure of common sense. The Court must place itself in the position of a person skilled in the relevant art, being the subject matter of the patent. From this perspective, the patent is to be read as a whole, in the context of the specification and in light of the prevailing common general knowledge and state of the relevant art at the priority date." [8]

19. The specification explains:

> "Acid herbicides such as 2,4-dichlorophenoxyacetic acid (2,4-D) have long been used to control unwanted vegetation. 2,4-D is normally converted into liquid formulations by conversion to water soluble salts or emulsified esters. The ester formulations have been found to be more effective than the salts on an acid equivalent basis in the control of noxious vegetation but have the unwanted

[3] Hay 1.1 at [5], [13], [22], Annexure PHM-1; Hay 2.1 at [5], [13], [22], Annexure PHM-1.
[4] Ouse 1 at [1], [3]; Ouse 2 at [1], [3].
[5] Pearson at [1], [8], [11].
[6] Wright 1 at [1], [3], [9], [10]; Wright 2 at [1], [3], [9], [10].
[7] Dow's submissions of 7 August 2019 at [147]-[150].
[8] [2013] FCA 214; 100 IPR 451 at [139].

> characteristic of migrating to adjacent desirable vegetation because of the volatility thereof, resulting in unacceptable damage to sensitive plants.
>
> Efforts to solve the volatility problem, including preparation of water soluble salts such as the dimethylamine salt of 2,4-D have not been totally satisfactory because, upon volatilization of the amine, the herbicide reverts back to its initial acid form, which, in itself under certain unfavorable conditions, has sufficient volatility to cause damage to sensitive crops."[9]

20. Accordingly, the specification states that:

> "it would be desirable to have an herbicidal carboxylic acid derivative that is at least as active as the commercially used carboxylic acid herbicide salts, but which is less volatile so that its use would not damage nearby sensitive crops."[10]

21. The specification then states:

> "It has now been found that compounds formed by combining a carboxylic acid herbicide with either a tetraalkylammonium or an (arylalkyl)trialkylammonium hydroxide have herbicidal activity on an acid equivalent basis at least comparable to the commercially used carboxylic acid herbicide salts, but with reduced volatility. Furthermore, the compounds can be more conveniently formulated as aqueous concentrates or emulsified liquids. The present invention concerns herbicidal compounds comprising the reaction product of an herbicidal carboxylic acid and an *N*-((C_1-C_{16}) alkyl or arylalkyl)tri((C_1-C_{16}) alkyl)ammonium hydroxide, where the alkyl groups can be the same or different."[11]

22. The specification describes herbicidal carboxylic acids as meaning:

> "those herbicides containing a carboxylic acid group and includes *benzoic acid herbicides* such as chloramben, dicamba, 2,3,6-TBA and tricamba; *organophosphorus herbicides* such as glufosinate and glyphosate; *pyrimidinyloxybenzoic acid herbicides* such as bispyribac and pyriminobac; *phthalic acid herbicides* such as chlorthal; *pyridine carboxylic acid herbicides* such as aminopyralid, clopyralid, fluroxypyr, picloram and triclopyr; *quinolinecarboxylic acid herbicides* such as quinclorac and quinmerac; *phenoxyacetic herbicides* such as 4-CPA, 2,4-D, 3,4-DA and MCPA; *phenoxybutyric herbicides* such as 4-CPB, 2,4-DB, 3,4-DB and MCPB; *phenoxypropionic herbicides* such as cloprop, 4-CPP, dichlorprop, 3,4-DP, fenoprop, mecoprop and mecoprop-P; and *aryloxyphenoxypropionic herbicides* such as chlorazifop, clodinafop, clofop, cyhalofop, diclofop, fenoxaprop, fluazifop, haloxyfop, isoxapyrifop, metamifop, propaquizafop, quizalofop and trifop. Preferred herbicidal carboxylic acids are 2,4-D, triclopyr, aminopyralid, clopyralid, fluroxypyr, picloram, cyhalofop, fluazifop, haloxyfop, clodinafop, fenoxaprop, dicamba, glufosinate and glyphosate."[12]

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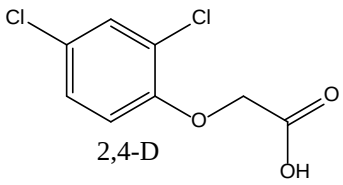
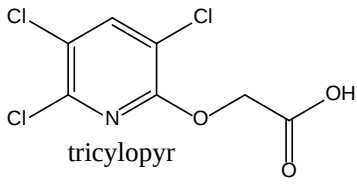
[9] 508 specification, page 1, lines 8-17.
[10] 508 specification, page 2, lines 1-4.
[11] 508 specification, page 2, lines 5-13.
[12] 677 specification, page 3, lines 5-20.

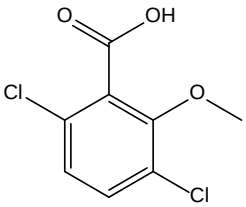
23. Structures of some of these compounds are shown below:[13]



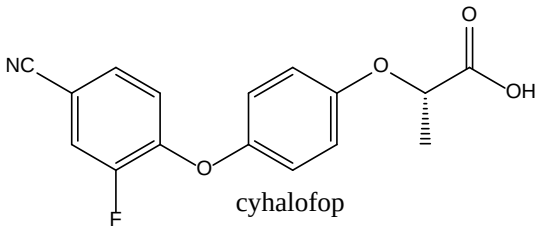
2,4-D



tricylopyr

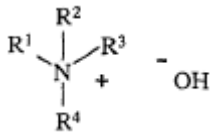


dicamba



cyhalofop

24. Further detail regarding the ammonium hydroxide is provided:

> "*N*-((C_1-C_{16}) Alkyl or arylalkyl) tri((C_1-C_{16}) alkyl)ammonium hydroxide refers to compounds of the formula
>
> 
>
>
> wherein R^1, R^2 and R^3 independently represents (C_1-C_{16}) alkyl or any two of R^1, R^2 and R^3 represent -$(CH_2)_n$- where n is an integer from 3-5 and R^4 represents ((C_1-C_{16}) alkyl or arylalkyl). Preferred *N*-((C_1-C_{16}) alkyl or arylalkyl) tri((C_1-C_{16}) alkyl)ammonium hydroxides are those in which R^1, R^2, R^3 and R^4 are the same or where R^1, R^2 and R^3 are CH_3 and R^4 is (C_2-C_{16}) alkyl or arylalkyl."[14]

25. The specification indicates that the compounds can be prepared by reaction of the herbicidal carboxylic acid with an appropriate *N*-((C_1-C_{16}) alkyl or arylalkyl)tri((C_1-C_{16}) alkyl)ammonium hydroxide:

> "The herbicidal carboxylic acid is mixed with the *N*-((C_1-C_{16}) alkyl or arylalkyl) tri((C_1-C_{16}) alkyl)ammonium hydroxide in a solvent like methanol followed by removal of the solvent and any water generated or present in the *N*-((C_1-C_{16}) alkyl or arylalkyl) tri((C_1-C_{16}) alkyl)ammonium hydroxide reactant under vacuum."[15]

26. Appropriate use of the compounds of the invention and suitable formulations thereof are also described.[16]

27. The following general preparative example is given:

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[13] Structures shown in Exhibit TRW-5 to Wright 2. I note that the butyl ester, rather than the free acid, of cyhalofop is shown in the exhibit.
[14] 508 specification, page 3, line 21 – page 4, line 5.
[15] 508 specification, page 4, lines 8-12.
[16] 508 specification, pages 5-8.

"The carboxylic acid herbicide and the *N*-((C_1-C_{16}) alkyl or arylalkyl) tri((C_1-C_{16}) alkyl)ammonium hydroxide are combined in equimolar amounts in methanol at room temperature to give a solution of the ammonium salt of the carboxylic acid. The product is then isolated by evaporative removal of the methanol (and any water present) at room temperature to 50°C. The products may be purified by methods known in the art to provide the compounds of the present invention as liquids or solids. Alternatively, the products of the invention may be prepared in water solvent and used as obtained. Table I below lists the compounds prepared in this manner with their physical state and MP where applicable.

Alternatively, the samples may be prepared by combining equimolar amounts of the carboxylic acid herbicide, an *N*-((C_1-C_{16}) alkyl or arylalkyl) tri((C_1-C_{16}) alkyl)ammonium halide (such as chloride or bromide) and a metal hydroxide (such as sodium or potassium hydroxide) in a solvent such as methanol. The product is then isolated by evaporative removal of the methanol (and any water present) at room temperature to 50°C and removing the metal halide salt by selective dissolution in water, to provide the compounds of the present invention as liquids or solids."[17]

28. Table I, reproduced below, indicates the compounds prepared and their physical properties.

TABLE I

Compound	Amine	Acid	Physical State	Melting Range (°C)
1a	tetramethylammonium hydroxide	2,4-D	solid	213-216 dec
1b	tetraethylammonium hydroxide	2,4-D	liquid	95-105
1c	tetrapropyl ammonium hydroxide	2,4-D	liquid	NA
1d	tetrabutyl ammonium hydroxide	2,4-D	solid	53-58
1e	choline hydroxide	2,4-D	solid	105-120
1f	N-benzyltrimethylammonium hydroxide	2,4-D	solid	84-86
1g	N-hexadecyltrimethylammonium hydroxide	2,4-D	solid	65-72
2a	tetramethylammonium hydroxide	triclopyr	solid	>170 dec
2b	tetraethylammonium hydroxide	triclopyr	solid	79-86
2c	tetrapropyl ammonium hydroxide	triclopyr	liquid	NA
2d	tetrabutyl ammonium hydroxide	triclopyr	solid	88-93
2e	choline hydroxide	triclopyr	solid	>160 dec
2f	N-benzyltrimethylammonium hydroxide	triclopyr	solid	166-171 dec
2g	N-hexadecyltrimethylammonium hydroxide	triclopyr	solid	73-77
3a	tetramethylammonium hydroxide	cyhalofop	solid	144-155
3b	tetrabutyl ammonium hydroxide	cyhalofop	liquid	NA
3c	N-benzyltrimethylammonium hydroxide	cyhalofop	solid	162-166
3d	N-hexadecyltrimethylammonium hydroxide	cyhalofop	liquid	NA
4a	tetramethylammonium hydroxide	dicamba	solid	175-181 dec

29. There are examples directed to both herbicidal efficacy and the volatility of the compounds of the invention. Table II, reproduced below, includes efficacy data on broadleaf weeds.

[17] 508 specification, page 9, lines 2-20.

TABLE II. Efficacy data generated in the greenhouse for 2,4-D and triclopyr on broadleaf weeds. Data are from evaluations taken 14 days after application.

Treatment / Compound Number	Rate (g ae/ha)	Broadleaf Dock *Rumex obtusifolia*	Kochia Kochia scoparia
		---------- % Control ----------	
2,4-D dimethylamine (DMA)	560	77	86
1a	560	77	83
1b	560	79	89
1c	560	73	83
1e	560	68	86
Triclopyr triethylamine (TEA)	560	81	91
2a	560	85	79
2b	560	79	88
2c	560	79	95

30. Table III, reproduced below, reports the injury to grapes (a sensitive species) after being grown adjacent to wheat plants treated with the compounds.

Table III. Injury to grapes from vapor exposure for 24 hours to various forms of 2,4-D, Triclopyr and Dicamba. Evaluations were taken 7 days after exposure to the vapors.

Treatment / Compound Number	---------- % Injury ----------
2,-4-D butoxyethylester (BEE)	100
2,-4-D dimethylamine (DMA)	78
1b	0
Triclopyr triethylamine (TEA)	57
2b	6
Dicamba DMA	70
4a	12

4. The claims

31. The correct approach to the construction of claims was discussed by Bennett J in *H Lundbeck A/S v Alphapharm Pty Ltd* (***Lundbeck***):

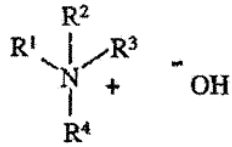
> "the words in a claim should be read through the eyes of the skilled addressee in the context in which they appear. … While the claims define the monopoly claimed in the words of the patentee's choosing, the specification should be read as a whole … It is not permissible to read into a claim an additional integer or limitation to vary or qualify the claim by reference to the body of the specification … terms in the claim which are unclear may be defined or clarified by reference to the body of the specification." [18]

4.1 The claims of the 508 application

32. The entire claim set of the 508 application is reproduced at Annex A. Claims 1, 3 and 7 are independent claims:

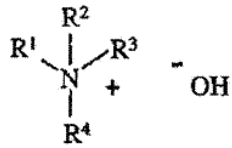
[18] [2009] FCAFC 70; 81 IPR 228 at [118]-[120].

1. An herbicidal compound comprising the reaction product produced by the process of:
   - combining 2,4-dichlorophenoxyacetic acid and a (tetraalkyl) ammonium hydroxide; in which the (tetraalkyl)ammonium hydroxide is a compound of the formula



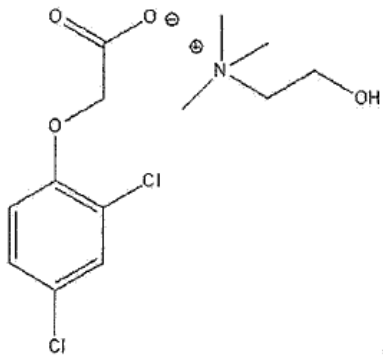
   wherein when R^1, R^2 and R^3 are methyl, R^4 is not methyl: and
   - isolating the reaction product, thereby producing the herbicidal compound.

3. An herbicidal compound comprising the reaction product produced by the process of:
   - combining 2,4-dichlorophenoxyacetic acid and a (tetraalkyl) ammonium hydroxide; in which the (tetraalkyl)ammonium hydroxide is a compound of the formula



   wherein R^1, R^2 and R^3 independently represents (C_1-C_{16}) alkyl or any two of R^1, R^2 and R^3 represent -$(CH_2)_n$- where n is an integer from 3-5 and R^4 represents ((C_2-C_{16}) alkyl or arylalkyl); and
   - isolating the reaction product, thereby producing the herbicidal compound.

7. An herbicidal compound comprising the reaction product produced by the process of:
   - combining 2,4-dichlorophenoxyacetic acid and choline hydroxide, said herbicidal compound having the formula:



   ; and
   - isolating the reaction product, thereby producing the herbicidal compound.

Herbicidal compound

33. The specification defines herbicide as "an active ingredient that kills, controls or otherwise adversely modifies the growth of plants."[19] A "herbicidally effective or vegetation controlling amount" is one which "causes an adversely modifying effect and includes deviations from natural development, killing, regulation, desiccation, retardation, and the like."[20] It is clear that 2,4-D is

[19] 508 specification, page 4, lines 13-14.
[20] 508 specification, page 4, lines 14-17.

inherently a herbicidal compound, but its effects are dependent on crop and dose, such that under certain conditions it can exhibit beneficial effects on plants.[21]

Produced by the process

34. Importantly, the claims are directed to herbicidal compounds that comprise the "reaction product produced by the process" of combining 2,4-D and a tetraalkylammonium hydroxide and isolating the product. The construction of this part of the claims is of some importance.

35. Discussing product by process claims in *Hospira UK Limited v Genentech Inc.*[22] (***Hospira***), Birss J referred to them as a claim "which straddles the boundary between products and processes" and said: "As a matter of language there are two kinds: (1) a product 'obtained by' a process, and (2) a product 'obtainable by' a process."[23] The first category of claim is limited to the product only when produced by the described process, whereas the second category is directed to a product *per se* that *can* be produced by the process, but need not have been.

36. Considering the present claims, Mr Hay stated that "the reaction product of the claims … is the reaction product of the reaction of a (tetraalklyl)ammonium moiety such as a choline cation and 2,4-D. … The hydroxide does not take part in the reaction."[24] Dr Wright observed that choline hydroxide is a strong base and as such is able to abstract essentially all free hydrogen ions associated with 2,4-D and give rise to a greater proportion of the 2,4-D salt.[25] However, it is clear the isolated 2,4-D choline (or other tetraalkylammonium) salt formed is the same regardless of the original tetraalkylammonium counterion.

37. Nufarm submitted that the present claims are of the second category referred to by Birss J, effectively defining a product *per se* not limited by its process of production. In Nufarm's submission, if the intention was that the claims be limited to the process by which they are produced clearer wording (e.g. "the reaction product *when* produced") could have been used and the claims in their present form engender uncertainty for third parties. Indeed, I note that claim 8 defines a herbicidal composition comprising "a compound, *when* produced according to the process of any one of claims 1 to 7" (emphasis added). However, this difference in language is to my mind not determinative one way or the other of the construction of claims 1, 3 and 7.

38. It is uncontroversial to say that claim construction is a matter for the relevant court or tribunal, and I note comments of the Full Court in *Multigate Medical Devices Pty Ltd v B Braun Melsungen AG* in relation to the use of expert evidence in this context:

> "…the evidence of a skilled reader is not determinative of a construction question. It is always a matter for the Court to construe the particular claim adopting the relevant lens, but giving such weight to expert evidence that it sees fit.
>
> …it is not the province of an expert to give evidence of the meaning of words or phrases used in a claim if those words or phrases bear their ordinary English meanings and are not suggested to have a technical or special meaning.

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[21] Wright 1 at [135]-[138].
[22] [2014] EWHC 3857.
[23] Ibid at [128].
[24] Hay 1.2 at [163].
[25] Wright 1 at [95].

> …if words or phrases are used in a claim in their ordinary English meaning, their meaning cannot be distorted by an expert's use of a functionality lens to give them an application in tension with their plain meaning."[26]

39. Mr Hay's evidence is that he understands claim 1 to fall into the "obtainable by" category referred to previously,[27] and Nufarm also referred to Dr Pearson's evidence:

> "Claim 1 defines a herbicidal compound comprising the reaction product produced by the process of combining 2,4-D acid and a (tetraalkyl)ammonium hydroxide (as defined in the claims) and isolating the reaction product, thereby producing the herbidical compound. As I understand the claim, there is no additional limitation on the method of preparing the reaction product."[28]

However, to the extent that this supports an "obtainable" construction (and in my view it may equally be understood as a reference to the lack of any requirement of specific reaction conditions), I consider that this is a construction question in relation to which great weight need not be attached to an expert's opinion; the words used have an ordinary English meaning.

40. For the same reason, while Nufarm submitted that recourse to the specification supported the "obtainable by" construction because the examples, said to be illustrative of the invention, relate to both the process defined in the claims and other processes, and there is nothing in the process of production that confers the desired reduced volatility, I do not think the body of the specification is of great support to Nufarm's case in construing this aspect of the claim given that the specification discloses, albeit among other things, a product produced by the defined process.

41. Dow submitted that the words of the claim most naturally describe a compound actually produced by the defined process and that there would be no utility in drafting the claims as an "obtainable by" claim – the skilled person understands what the product of the reaction described is, and so there is no need to describe it indirectly.

42. I agree with Dow that a "reaction product produced by the process …" requires, as a matter of ordinary English, that the reaction product actually be produced by the defined process, and in my opinion this wording sufficiently clearly defines the "obtained by" category of claim referred to by Birss J. While I appreciate that other wording could have been adopted, perhaps with greater clarity, I consider that the words used provide a tolerably clear limitation to the claim.[29]

Alkyl

43. While the description appears to distinguish between tetraalkylammonium compounds and (arylalkyl)trialkylammonium compounds[30] it is apparent that in the context of the claims, "tetraalkyl" includes the possibility for the alkyl moieties to be arylalkyl. The specification provides the following definition:

> "Unless specifically limited otherwise, the term 'alkyl', as well as derivative terms

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[26] [2016] FCAFC 21; 117 IPR 1 at [25]-[27].
[27] Hay 1.2 at [14].
[28] Pearson at [31].
[29] I note that in *Aktiebolaget Hässle v Biochemie Australia Pty Ltd* [2003] FCA 496, 87 IPR 1 Sackville J appeared to accept that analogous wording was limiting on the scope of a product by process claim (at [35]).
[30] See, e.g. 508 specification, page 2, lines 6-7; page 9, lines 2-3.

> such as 'arylalkyl', as used herein, include within their scope straight chain, branched chain and cyclic moieties. Unless specifically stated otherwise, each may be unsubstituted or substituted with one or more substituents selected from but not limited to halogen, hydroxy, alkoxy or alkylthio, provided that the substituents are sterically compatible and the rules of chemical bonding and strain energy are satisfied. The term 'aryl' refers to a phenyl, indanyl or naphthyl group. The aryl group may be substituted or unsubstituted with one or more substituents selected from halogen, hydroxy, C_1-C_6 alkyl or C_1-C_6 alkoxy, provided that the substituents are sterically compatible and the rules of chemical bonding and strain energy are satisfied. The term 'arylalkyl' refers to C_1-C_4 alkyl groups substituted with an aryl group."[31]

44. The defined alkyl substituents are "selected from but not limited to" those specified. Pursuant to section 60(3), the Commissioner may take into account a ground of opposition whether relied on by the opponent or not, and I asked the parties whether this open-ended definition gives rise to any section 40 deficiency, noting the guidance set out in the Patent Manual of Practice and Procedure in relation to "optionally substituted" moieties:

> "Broader terms, such as 'optionally substituted' where the substituents are not defined, are unlikely to be supported over their entire scope. An undefined substituent will encompass a diverse range of possibilities which cannot represent an underlying principle of general application. An example of one substituent, or even several examples, cannot enable **all** others. In the majority of cases, such claims will not be enabled over their full width and the scope of the claims will exceed the contribution to the art, contrary to sec 40(2)(a) and sec 40(3)."[32]

45. In response, Nufarm noted the breadth of the claims with respect to the disclosure in relation to several general aspects which it submitted lead to a failure to comply with section 40: the length of the alkyl chain, the nature of the substituents (choline is the only example of a substituted alkyl), arylalkyl and cyclic alkyl moieties. Nufarm submitted that the claims "would certainly include a large and diverse range of possibilities."[33] Dow indicated "[a]s a pragmatic matter" a preparedness to amend the description to limit the definition such that only halogen, hydroxyl, alkoxy or alkythio substituents would be within the scope of the claims.[34] Notwithstanding Dow's proposal, I will give consideration to the matter and it is convenient to do so here.

46. I think it must, as a matter of logic, be accepted that the specification, together with the common general knowledge, does not enable a person skilled in the art to prepare tetraalkyl ammonium compounds containing hitherto unanticipated substituent structures. However, this is not necessarily an end to the matter, as made clear by the statements of Kitchin J in *Regeneron Pharmaceuticals, Inc v Kymab Limited*:

> "First, it is not the law that a specification must necessarily enable the skilled person to make or perform all of the embodiments of a claimed invention. Were it otherwise, claims would be insufficient if they covered inventive improvements. But, as the decision in *Polypeptide expression/Genentech I* makes clear, in appropriate cases, a claim may embrace variants which may be provided or

[31] 508 specification, page 2, line 21 – page 3, line 4.
[32] Patent Manual of Practice and Procedure at 2.11.7.9A (effective date 1 February 2019).
[33] Nufarm's submissions of 23 August 2019 at [3].
[34] Dow's submissions of 23 August 2019 at [6].

> invented in the future and which achieve the same effect in a manner which could not have been envisaged without the invention.
>
> Secondly, the assessment of insufficiency must be sensitive to the nature of the invention and the facts of the particular case. If the character of the invention is one of general methodology or is such that the invention is of general application then it may be permissible to claim it in general terms, even though the specification does not enable every way of arriving at its subject matter. …
>
> Thirdly, it is a general principle that the protection afforded by the claims must correspond to the technical contribution to the art made by the disclosure of the invention. The patentee is entitled to fair protection having regard to the nature and character of the invention he has described." [35]
>
> "If the patentee has found a new product which has a beneficial effect but cannot demonstrate there is a common principle by which that effect will be shared by other products of the same class, he will be entitled to a patent for that product, but not for the class. But if he has disclosed a beneficial property which is common to the class, he will be entitled to a patent for all the products of that class even though he has not himself made more than one or two of them."[36]

47. As the Deputy Commissioner said in *Grant Fisher v ToolGen Incorporated*:

> "if the invention discloses a principle of general application then the claims may be drafted in correspondingly broad terms. There may indeed be subsequent developments in the art or further embodiments within the defined principle that could be considered inventive, but this would not necessarily render the claim lacking in sufficiency." [37]

48. As an initial point, I will say that I do not think that the present alkyl moieties can reasonably be said to be substituted by *anything* – the claim is directed to a herbicidal compound and therefore any substituents which are inconsistent with retention of that function would not be within the scope of the claim.[38] To my mind, the question here is whether there is a common principle underlying the tetraalkylammonium cation such that the technical contribution to the art may be seen to extend to the class or is limited to a subset of tetraalkylammonium cations.

49. Dr Pearson explained the way the invention works as follows:

> "Quaternary ammonium compounds are permanently charged in ionic form and cannot exchange a proton, because they do not contain exchangeable protons.
>
> The significance of this structural difference means that alkylamine compounds

[35] [2018] EWCA Civ 671 at [231]-[233].
[36] Ibid at [238].
[37] [2018] APO 65 at [62].
[38] I note that the EPO Board of Appeal considered claims directed to compounds *per se* having undefined substituents and asserted to have herbicidal properties in *Triazoles/AGREVO* (T939/92) [1996] OJ EPO 309. The Board considered that substituted had its ordinary technical meaning (i.e. substituted by anything) and concluded that it was not plausible in that case that all substituted compounds would possess the requisite herbicidal effect. This did not give rise to a lack of support or sufficiency – the Board noted at 316 that "the examining division had no doubts as to the possibility of preparing the claimed compounds" – but did lead to a finding of lack of inventive step.

> exist in equilibrium with a variety of 2,4-D species, including the volatile 2,4-D acid, but quaternary ammonium compounds only exist with the less volatile 2,4-D anion.
>
> In the case of alkylamine compounds, when the amount of alkylamine compound in solution with 2,4-D is diminished, for example by evaporation of the alkylamine compound, the equilibrium shifts towards the more volatile 2,4-D acid. This shift in the equilibrium towards the more volatile 2,4-D acid can be ameliorated by increasing the molecular weight of the alkylamine compound to minimise its loss from the mixture by evaporation. …
>
> In the case of quaternary ammonium compounds, the molecular weight principle in respect of alkylamine compounds does not apply. … Quaternary ammonium compounds ionically associate with the 2,4-D anion and, unlike alkylamine compounds, are not capable of providing the 2,4-D acid. Quaternary ammonium compounds are generally of very low volatility due to their core charged structure."[39]

50. Notwithstanding Mr Hay's view that this analysis is flawed,[40] it is in my opinion technically credible.[41] Given this, and considering the specification as a whole, I do not consider that the claims as presently drafted exceed the contribution to the art with respect to the definition of the tetraalkylammonium cation. That is, the reference to the tetraalkylammonium cation in the specification is in general terms, the strong inference to be drawn from Dr Pearson's evidence is that a skilled person would understand that substantially any such cation would be expected to work in the context of the invention (that is, to afford the desired decreased volatility) and the evidence does not suggest that a skilled person would experience any difficulty in preparing any given tetraalkylammonium salt of 2,4-D.[42] In these circumstances I consider that there is a common principle underlying the broadly defined tetraalkylammonium cation and accordingly I do not consider there to be a deficiency with respect to support or sufficiency in this regard.

51. Claims 2 and 3 (and claim 1 of the 677 application discussed below) define a circumstance in which any two of R^1, R^2 and R^3 represent $-(CH_2)_n-$ wherein n is 3-5. From my experience reading patent specifications I understand these claims to be referring to a circumstance in which two of R^1, R^2 and R^3 *together* represent this moiety, such that a 4-6 membered ring containing the quaternary nitrogen is formed. At the hearing I indicated to the parties that this was my understanding, and while it differs from that of the experts,[43] nothing turns on it.

Isolating

52. Mr Hay indicated that he understood the reference to "isolating" in the claim to mean that the product of the reaction is separated from the solution in which it was prepared, rather than being "pure" as such.[44] Dr Pearson agreed with that view.[45] This is consistent with the reference in the

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[39] Pearson at [43]-[46].
[40] Hay 1.2 at [31]-[35].
[41] I note also the observation in Piper (1998), Farmnote 47/97, identified as D5 in both statements of grounds and particulars that: "The salts are a two-part molecule, one half with a positive charge and one half with a negative charge. This makes them totally non-volatile."
[42] Hay 1.2 at [28].
[43] Ouse 1 at [76], Hay 1.1 at [227]. In relation to the 677 specification: Ouse 2 at [67], Hay 2.1 at [145].
[44] Hay 1.1 at [82]-[84].
[45] Pearson at [25].

specification to isolation by evaporative removal of methanol separately from purification by "methods known in the art".[46]

Proviso

53. The product of the reaction of 2,4-D and tetramethylammonium hydroxide is excluded from claim 1 by proviso, and does not fall within the scope of independent claims 3 or 7.

Appended claims

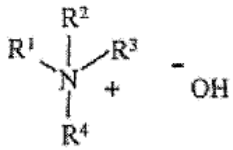
54. Claims 2 and 4-6 define particular substituents on the ammonium moiety.

55. Claim 8 defines a herbicidal composition comprising a compound "when produced according to the process of any one of claims 1 to 7, or mixtures thereof, in admixture with an agriculturally acceptable adjuvant or carrier." Claims 9-11 define narrowing features of the composition.

56. Claims 12 and 13 define a method of controlling undesirable vegetation by contacting the vegetation or the locus thereof, or the soil, with a herbicidally effective amount of a compound when produced according to the process of claims 1-7 or a composition according to claims 8-11, respectively. Claims 14 and 15 are in the same terms as claims 12 and 13 but refer to controlling undesirable vegetation in a crop that has been made tolerant or resistant to 2,4-D.

4.2 The claims of the 677 application

57. Claim 1 is the only independent claim:

> 1. A method for preventing a herbicidal composition that has been administered to a locus of unwanted vegetation from injuring a crop that neighbors the locus and to which the herbicidal composition has not been administered, the method comprising administering to the locus of unwanted vegetation but not to the crop, a herbicidal composition comprising the reaction product of a herbicidal carboxylic acid and a (tetraalkyl) ammonium hydroxide; in which the (tetraalkyl)ammonium hydroxide is a compound of the formula:
>
> 
>
>
> wherein R^1, R^2 and R^3 independently represents alkyl or any two of R^1, R^2 and R^3 represent -$(CH_2)_n$- where n is an integer from 3-5 and R^4 represents ($(C_1$-$C_{16})$ alkyl or arylalkyl), thereby preventing the herbicidal composition from injuring the crop.

58. In Nufarm's submission the preamble to the claim, that is, "for preventing a herbicidal composition that has been administered to a locus of unwanted vegetation from injuring a crop that neighbors the locus and to which the herbicidal composition has not been administered" has no limiting effect on the claim, which is simply defined by the steps of the method. That is, carrying out the method steps of administering the herbidical composition to unwanted vegetation but not the neighbouring crop will achieve the result of preventing injury to the crop and a desire not to damage a crop is implicit or inherent in the decision not to apply herbicide to it – there is

[46] 508 specification, page 9, lines 5-8.

no particular method in which the herbicide is used to afford the prevention of injury. I find there to be some force to this submission.

59. Dow submitted that the method has to be done for the purpose of preventing damage to a neighbouring crop, but that could be assessed objectively, for example, the method would not be worked if there was no neighbouring crop, or if a neighbouring crop was planted subsequent to the administration of the herbicide.

60. Dow referred to *Apotex Pty Ltd v Sanofi-Aventis Australia Pty Ltd (No 2)*[47] (***Apotex***) and Nufarm to *Otsuka Pharmaceutical Co., Ltd v Generic Health Pty Ltd (No 2)*[48] (***Otsuka***) in support of their positions regarding construction of the present claims. In *Apotex* the Full Court, with whom the High Court agreed,[49] considered that a claim in the terms "A method of preventing or treating … psoriasis, which comprises administering to a recipient an effective amount of a pharmaceutical composition …" was confined to the deliberate administration of the composition to prevent or treat psoriasis, and did not encompass administration for some other purpose which had the effect of incidentally treating or preventing psoriasis.[50] Dow submitted that what is required in this case is an objective assessment of whether the method has the required purpose and achieves the desired goal, but incidental reduction of injury to a neighbouring crop would not fall within the scope of the present method. In *Otsuka*, the Full Court considered a claim directed to a method of treating a patient suffering from central nervous system disorders associated with the 5-HT_{1A} receptor sub-type, the disorders further defined as (1) cognitive impairment associated with various schizophrenias, and (2) having failed to respond to specified antipsychotic drugs. The Court, having regard to the wording of the claim and the teaching of the specification considered that the feature of association with the 5-HT_{1A} receptor sub-type was simply descriptive of the subsequently identified disorders and did not represent a stand-alone feature that meaningfully impacted the scope of those disorders.[51] Nufarm submitted that reduction of injury to neighbouring crops was merely the result of administering the claimed herbicides in a typical manner (i.e. applying to one crop and not another) and simply represents an accretion of knowledge analogous to *Otsuka*.

61. In *Apotex* the court attached significance to the fact that in the treatment of specific medical conditions there is a pre-condition of diagnosis by a physician, which is not the case here. I agree with Nufarm that the preamble simply describes the outcome of following the steps of the method. That is, I consider that the claim simply requires administering the herbicidal composition to a locus of unwanted vegetation neighbouring a crop to which the composition is not administered. This may be contrasted with a situation in which herbicide is applied to both unwanted vegetation *and* a neighbouring crop.

Neighbouring

62. While neighbouring is not defined, the specification refers to migration of volatile ester formulations to "adjacent desirable vegetation"[52] and avoidance of damage to "nearby sensitive crops."[53] Mr Hay referred to these passages in considering the spatial relationship between the

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[47] [2012] FCAFC 102; 96 IPR 185.
[48] [2016] FCAFC 111; 120 IPR 431.
[49] *Apotex Pty Ltd v Sanofi-Aventis Australia Pty Ltd* [2013] HCA 50; 253 CLR 284.
[50] *Apotex* at [37]-[46] (Keane CJ), [125]-[128] (Bennett and Yates JJ).
[51] *Otsuka* at [99]-[102] (Besanko and Nicholas JJ), [162]-[168] (Beach J).
[52] 508 specification, page 1, lines 11-15.
[53] 508 specification, page 2, lines 3-4.

locus of unwanted vegetation and the neighbouring crop, noting that the application "provides no dimension".[54] Mr Ouse stated that the testing associated with the data shown in Table III of the specification "simulates a sensitive crop being grown downwind from treated unwanted vegetation."[55] In written submissions Dow equated neighbouring with "proximate to".[56] Given the evidence and the specification, I understand neighbouring in the context of the claim broadly, such that the claim encompasses situations in which the unwanted vegetation to which the herbicide is applied is directly adjacent to or neighbouring the crop (such as a weed within an orchard) or where a field of unwanted vegetation is adjacent to a crop containing field.

Preventing

63. There is no definition of, or even reference to, preventing or prevention in the specification. In Nufarm's submission preventing injury requires there to be no injury at all to a neighbouring crop. Dow submitted that, considered in the context of the specification and according to a common sense interpretation, preventing requires something less than absolute avoidance of injury, such that injury to the neighbouring crop is hindered or reduced.

64. It was common ground that the doctrine of "file wrapper estoppel" is not established in Australia,[57] but that pursuant to section 116 the Commissioner may, in construing an amended specification, have regard to the unamended specification. In this regard, Nufarm observed that the claims as filed defined a "method for reducing or preventing injury to non-target plants" and submitted that deletion of reference to "reducing" was consistent with construction of the claim as directed only to a method that leads to no injury to non-target plants. In response, Dow submitted that succinctness and clarity of claim drafting is preferable (i.e. use of three words where one will suffice is undesirable), the amendment provides no clear indication of the correct construction of "preventing", and the claim should be construed according to the ordinary rules of construction.

65. I draw guidance from *Bradken Resources Pty Ltd v Lynx Engineering Consultants Pty Ltd*[58] in which Nicholas J construed the claim before him in accordance with the usual principles before considering the operation of section 116. In considering the amendment he said: "the amendment tends to confirm that, properly construed, claim 1 requires that …". That is, consideration of the unamended specification was supportive, but not determinative, of the construction of the claim. The Full Court considered that in that case the amendment was "another significant factor" supporting the technical meaning of the term in question.[59]

66. Clearly, the amendment is a relevant consideration, and is perhaps more supportive of Nufarm's construction. However, I am not persuaded that in the present circumstances the nature of the amendment can be considered clearly determinative of the construction, and I will construe the claims according to the usual principles.

67. The evidence of the declarants is consistent with the submissions of the respective parties. Mr Hay stated:

> "Claim 1 makes it clear that the invention centres on a method of 'preventing' a

[54] Hay 2.2 at [65].
[55] Ouse 2 at [53].
[56] Dow's submissions of 7 August 2019 at [43].
[57] See *Lynx Engineering Consultants Pty Ltd v The Pilbara Infrastructure Pty Ltd* [2016] FCAFC 19 at [80]-[81].
[58] [2015] FCA 1100 at [84].
[59] *Lynx Engineering Consultants Pty Ltd v The Pilbara Infrastructure Pty Ltd* [2016] FCAFC 19 at [65].

> herbicidal composition from injuring a nearby sensitive crop that neighbours the locus of the unwanted vegetation. The Merriam-Webster dictionary defines the term 'preventing' as meaning '*to stop (something) from happening or existing*' and this appears to be in line with the stated objective … of the opposed Patent Application. However when I consider the relevant supporting data set out in Table III, the method of 'prevention' as defined in claim 1 is not achieved with all the herbicidal carboxylic acids that fall within the scope of the claim. … The results show that there was a measurable visible injury to the grapes following the vapour exposure for 24 hours to herbicidal compositions 2b and 4a of 6% and 12% respectively."[60]

Mr Hay did note though that this understanding was counter to the teaching of the specification:

> "The references in claim 1 to 'preventing injury to a crop that neighbours a locus of unwanted vegetation' runs contradictory to the teaching in the specification; most relevantly Table III."[61]

68. In contrast to Mr Hay, Mr Ouse said:

> "I do not consider 'preventing', in the context of the Patent Application, to be an absolute term with a meaning of 0% injury… For example, as described in the Patent Application …, visual injury is assessed on a scale, ranging from 0% being no injury and 100% being complete death of the plant. … If Hay's interpretation of 'prevention of injury' was correct, there would be no need for a range which accounts for degrees of injury prevention, and the assessments would be simply 'yes or no'.
>
> … I am aware that a herbicide seeking regulatory approval must comply with efficacy and safety criteria, and I am not aware of any Regulatory Authority that requires these criteria to be absolutes. For example, a herbicide deemed 'safe' does not necessarily mean that *no* injury occurs. Rather, the injury may be only minor or transient. Similarly, a claim in an application seeking regulatory approval to prevent injury would not require 0% injury."[62]
>
> "I and others in the field, would recognize only 6% and 12% injury to be representative of preventing injury.
>
> Furthermore, the inventive compositions show significantly less injury to sensitive crops compared to herbicidal standards. In the context of the Patent Application, which describes the inventive compositions as having reduced volatility compared to commercially used carboxylic acid herbicidal salts so that its use would not damage nearby sensitive crops, the inventive compositions prevent injury compared to herbicidal standards."[63]

69. In my view the overall object of the specification is the provision of a herbicidal salts that provide a lesser degree of damage to neighbouring plants than existing commercial products, that is, they

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[60] Hay 2.1 at [140].
[61] Hay 2.1 at [144].
[62] Ouse 2 at [33]-[34].
[63] Ouse 2 at [36]-[37].

exhibit "reduced volatility" rather than being described as absolutely non-volatile, and the examples indicate that injury to neighbouring plants is not invariably completely avoided. I consider the construction advanced by Dow more consistent with the context of the specification as a whole, as is effectively acknowledged by Mr Hay, and with a common sense and practical approach to a claim directed to a biological system. I take preventing, in the context of the present specification, to mean that injury or damage to the neighbouring crop is substantially reduced or attenuated relative to the described commercially available herbicidal carboxylic acid salts.

Injuring

70. The specification is clearly related to injury to non-target crops from vapour exposure and this is what is exemplified, but as Nufarm noted, the claims are not, in terms, so narrowly focused. In the context of the steps defined in the method for preventing injury to the neighbouring crop, that is, application of a herbicide of reduced volatility, I consider that the most reasonable construction is that the injuring referred to in the claim is that associated with vapour exposure.

Reaction product

71. Notably, claim 1 of the 677 application refers simply to the "reaction product of a herbicidal carboxylic acid and a (tetraalkyl) ammonium hydroxide" in contrast to the "reaction product produced by the process …" recited in the claims of the 508 application. I raised this difference at the hearing, as on an initial reading it suggests that the claims of the 677 application insofar as they relate to the reaction product may be more akin to obtainable than obtained by claims, in the language of Birss J.

72. Dow accepted that the language is less clear in the 677 application than the 508 application, but submitted that on balance, the process of producing the reaction product still formed part of the method of the claim because it would otherwise be a curious and cumbersome way to describe the product in circumstances where there was no obstacle to simply describing the product.

73. It is, to my mind, notable that the specification indicates that "compounds of the present invention", described as "the reaction product of an herbicidal carboxylic acid and an *N*-((C_1-C_{16}) alkyl or arylalkyl)tri((C_1-C_{16}) alkyl)ammonium hydroxide," may be produced both by reaction of a quaternary ammonium hydroxide with a carboxylic acid herbicide and by reaction of a carboxylic acid herbicide, a quaternary ammonium halide and a metal hydroxide.[64] That is, an exemplary method provided for producing the reaction product supports an "obtainable" construction. Further, I note that Mr Ouse indicated that any of the three preparative methods described in the specification (i.e. including the method that includes an ammonium halide starting material) would provide the defined reaction product: "I agree with Hay that three alternative preparative methods are provided on page 9 of the Patent Application that instructs me how to prepare the compositions utilized in the claimed method."[65] Accordingly, to the extent that they are relevant the specification and the declarants' evidence do not support an "obtained by" limitation to the claim.

74. While I agree with Dow that the wording of the claim is more complex than necessary to define a

[64] 508 specification, page 9, lines 2-20.
[65] Ouse 2 at [68]. See also [41]. This may be contrasted with Ouse 1 at [45] regarding the 508 application: "at least the first method described on page 9, lines 2-8 of the Patent Application would result in a compound according to claim 1".

quaternary ammonium salt of a herbicidal carboxylic acid, it is nevertheless a comprehensible use of language. On balance I consider that an "obtainable" construction is most consistent with the normal and natural meaning of the language, and is in accordance with the context of the specification and the evidence. I understand the herbicidal composition to comprise a quaternary ammonium salt of a herbicidal carboxylic acid.

Herbicidal composition

75. The herbicidal composition is defined as "comprising the reaction product". This language has been construed by courts in Australia as either inclusive or exclusive of further components depending on the context of its use.[66] There is no dictionary definition of "comprising", but the specification makes clear that the compounds of the invention may be used in conjunction with other herbicides, including being coformulated.[67] I consider that further actives may be included in the herbicidal composition of claim 1.

Alkyl

76. The same definition of alkyl and construction of "any two of R^1, R^2 and R^3 represent $-(CH_2)_n-$" as applies to the claims of the 508 application applies to the claims of the 677 application.

Appended claims

77. Claim 2 defines the method of claim 1 wherein the herbicidal carboxylic acid is 2,4-D. Claims 3-7 define narrowing features of the substituents on the ammonium moiety. Claims 8-10 define specific non-target crops (which I understand to mean the crop that neighbours the locus to which the herbicidal composition is applied), and claim 11 defines that the specific non-target crop is tolerant or resistant to 2,4-D. Claim 12 defines the method of any of the preceding claims wherein the unwanted vegetation is broadleaf weeds.

5. Novelty

78. It is a requirement of subsection 18(1) of the *Act* that the invention, so far as claimed in any claim, is novel. Subsection 7(1) provides that an invention is taken to be novel unless it is not novel in light of the prior art base. Prior art information made publicly available in a document or through the doing of an act forms part of the prior art base for the purpose of novelty if it was published before the priority date of a claim.

79. It is well established that the general test for lack of novelty is the reverse infringement test, as set out by Aickin J in *Meyers Taylor Pty Ltd v Vicarr Industries Ltd*:

> "The basic test for anticipation or want of novelty is the same as that for infringement and generally one can properly ask oneself whether the alleged anticipation would, if the patent were valid, constitute an infringement". [68]

80. This test is satisfied if the alleged anticipation discloses all the essential features of the invention

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[66] See, e.g., *Fresenius Medical Care Australia Pty Limited v Gambro Pty Limited* [2005] FCAFC 220; 67 IPR 230 at [64]; *General Clutch Corporation v Sbriggs Pty Ltd* [1997] FCA 499; 38 IPR 359 at 372-376; *Asahi Kasei Kabushiki Kaisha v WR Grace and Co* [1991] FCA 530; 22 IPR 491 at 514-515.
[67] 508 specification, page 5, lines 8-20.
[68] [1977] HCA 19; 137 CLR 228 at 235, [20].

as claimed.[69] The level of disclosure required is set out in *General Tire & Rubber Co v Firestone Tyre and Rubber Co Ltd*:

> "If the prior inventor's publication contains a clear description of, or clear instructions to do or make, something that would infringe the patentee's claim if carried out after the grant of the patentee's patent, the patentee's claim will have been shown to lack the necessary novelty, that is to say, it will have been anticipated. …if carrying out the directions contained in the prior inventor's publication will inevitably result in something being made or done which, if the patentee's patent were valid, would constitute an infringement of the patentee's claim, this circumstance demonstrates that the patentee's claim has in fact been anticipated.
>
> If, on the other hand, the prior publication contains a direction which is capable of being carried out in a manner which would infringe the patentee's claim, but would be at least as likely to be carried out in a way which would not do so, the patentee's claim will not have been anticipated, although it may fail on the ground of obviousness. To anticipate the patentee's claim the prior publication must contain clear and unmistakable directions to do what the patentee claims to have invented. A signpost, however clear, upon the road to the patentee's invention will not suffice. The prior inventor must be clearly shown to have planted his flag at the precise destination before the patentee." [70]

81. It is well established that the specificity of a disclosure is significant when determining anticipation, as highlighted by the majority in *AstraZeneca AB v Apotex Pty Ltd*:

> "The metaphor of planting the flag has been taken up in this Court. For example, in *ICI Chemicals*, the Full Court at [51], after noting the metaphor, remarked that, in that case, the appellant's argument involved the skilled addressee rummaging through a 'flag locker' to find a flag which the prior art document possessed and could have planted. In *Apotex Pty Ltd and Another v Sanofi-Aventis and Another* [2008] FCA 1194; (2008) 78 IPR 485 ('Sanofi-Aventis (2008)'), Gyles J at [91] adopted a different metaphor, remarking that 'anticipation is deadly but requires the accuracy of a sniper, not the firing of a 12 gauge shotgun'. Each metaphor underlines the importance of the specificity required in order for a prior art document to anticipate an invention as claimed." [71]

82. While it is clear that this does not mean a prior art document may only anticipate what is exemplified,[72] equally, "even if the prior art theoretically includes all of the integers of the invention (among other possible combinations), this is *not necessarily* to anticipate a later patent."[73] Bennett J explained this in *Lundbeck*:

> "Where the prior disclosure is to a broad chemical claim encompassing many compounds there may not be anticipation in the absence of the skilled addressee understanding or perceiving a specific compound in the disclosure. That is, there is

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[69] See *Nicaro Holdings Pty Ltd v Martin Engineering Co* (1990) 16 IPR 545 at 549.
[70] *General Tire & Rubber Co v Firestone Tyre and Rubber Co Ltd* [1972] RPC 457 at 485-486 (citations omitted).
[71] [2014] FCAFC 99; 107 IPR 177 at [294].
[72] *Apotex Pty Ltd v Sanofi-Aventis* [2009] FCAFC 134 at [108].
[73] *Eli Lilly and Company Limited v Apotex Pty Ltd* [2013] FCA 214; 100 IPR 451 at [272].

> no actual description of the particular compound to the skilled addressee; there is no relevant disclosure. There may be a distinction, albeit fine, between a 'fleeting' or 'paper' disclosure or the 'intellectual content' of a disclosure on the one hand and a 'disclosure for novelty purposes' or 'enabling disclosure' on the other. It depends on what the skilled reader would understand."[74]

83. In *Novozymes A/S v Danisco A/S*[75] it was clarified that where a publication provides a direction which, if followed, would inevitably result in something that falls within the scope of the claims, that is sufficient. It is not necessary for the skilled person to understand the presence of the inevitable result of the disclosure.[76]

84. Nufarm drew my attention to the approach taken in *Kirin-Amgen Inc v Hoechst Marion Roussel Limited*[77] (***Kirin-Amgen***) and subsequently in *Hospira* with regard to the novelty of product by process claims in the UK. Having considered the UK and EPO authorities in relation to product by process claims Birss J set out the following principles in *Hospira*:

> "i) A new process which produces a product identical to an old product cannot confer novelty on that product. To be novel a product obtained or obtainable by a process has to have some novel attribute conferred on it by the process as compared to the known product.
>
> ii) This rule is a rule of the law of novelty. It is not a principle of claim construction. Although in effect the rule treats 'obtained by' language as 'obtainable by' language, nevertheless as a matter of claim construction a claim to a product 'obtained by' a process means what it says. That will be the relevant scope of the claim as far as infringement and sufficiency are concerned.
>
> iii) Although normally a patent is drafted by the inventor 'in words of his own choosing', the EPO will not permit overt product by process language unless there is no other alternative available. By no other alternative, they mean no other way of defining a particular characteristic of the product in question."[78]

85. While accepting that there is no precedent in Australia for this approach, Nufarm submitted that I should adopt this approach, noting the general approval with which *Kirin-Amgen* has been referred to by Australian courts (with respect to construction) and the move towards harmonisation of Australian and European patent law.

86. Dow submitted that there is no authority supporting adoption of this approach in Australia (and it is inconsistent with High Court authority), nor any reason to do so, noting that section 70(2)(b) expressly contemplates claims encompassing pharmaceutical substances "when produced by a process" involving the use of recombinant DNA technology, and the definition of exploit is such that the monopoly conferred by a product by process claim is the same as that conferred by a claim to the corresponding process.

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[74] [2009] FCAFC 70; 81 IPR 228 at [173] (citations omitted).
[75] [2013] FCAFC 6; 99 IPR 417.
[76] Ibid at [166].
[77] [2004] UKHL 46; 64 IPR 444.
[78] *Hospira* at [147].

87. In my view the approach suggested by Nufarm is irreconcilable with the reverse infringement test, for which there is clear endorsement in Australia.[79] While there are nuances to the application of the reverse infringement test (for example, with respect to the requirement for an enabling and sufficient disclosure[80]), I cannot see any basis in Australian law for the desertion of this approach to the extent advocated by Nufarm. Indeed, in *Kirin-Amgen* when overturning the decision of the Court of Appeal and adopting the approach of the EPO, Lord Hoffmann said:

> "I think it is important that the UK should apply the same law as the EPO and the other member states when deciding what counts as new for the purposes of the EPC… It is true that this means a change in a practice which has existed for many years. … It would be most unfortunate if we were to uphold the validity of a patent which would on identical facts have been revoked in opposition proceedings in the EPO."[81]

Such considerations are not, however, in play here. As the High Court has observed, Australia is not a party to the EPC.[82] I will approach the consideration of novelty in the usual manner, using the reverse infringement test.

88. Each of the documents discussed below was published before the priority date of the present claims and as such forms part of the prior art base for the purpose of novelty (and inventive step).

5.1 GB 1 339 315

89. GB 1 339 315 (**D3**) relates to improved non-volatile herbicidal compositions. D3 discusses the typical lower efficacy, but concomitant lower volatility, of amine salts of herbicidal acids relative to ester derivatives, and discloses the invention as providing a herbicidal salt composition produced by reacting at least two bases with a herbicidally active acid (such as 2,4-D) to form a mixture of salts that is liquid at 20°C and is adjusted, if necessary, to have an absolute surface tension of not more than 35 dynes/cm measured at 25°C in distilled water at 1% active concentration. Upon evaporation of an aqueous or polar liquid carrier the mixture is disclosed as capable of remaining liquid for extended periods of time.[83] D3 indicates that the salts:

> "are those which after admixture with one or more other salts, possess the property of being liquid when measured at 20°C. …such salts may individually be liquid at 20°C and may be chosen from the primary amine salts… secondary amine salts… tertiary amine salts… and as well, the quaternary ammonium salts … Other salts which may be employed include the alkali metal salts and the salts formed by the reaction of other bases such as ammonium hydroxide, with the appropriate acids."[84]

The substituents of the amines/ammonium salts may be alkyl, alkoxy, or hydroxy substituted alkyl.

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[79] See, e.g., *Meyers Taylor Pty Ltd v Vicarr Industries Ltd* [1977] HCA 19; 137 CLR 228 at 235, [20], *AstraZeneca AB v Apotex Pty Ltd* [2014] FCAFC 99; 107 IPR 177 at [299].
[80] See, e.g., *Nicaro Holdings Pty Ltd v Martin Engineering Co* (1990) 16 IPR 545 at 549, *Acme Bedstead Company Limited v Newlands Brothers Limited* (1937) 58 CLR 689 at 707, *AstraZeneca AB v Apotex Pty Ltd* [2014] FCAFC 99; 107 IPR 177 at [302].
[81] *Kirin-Amgen* at [101].
[82] *Lockwood Security v Doric Products* [2004] HCA 58; 217 CLR 274 at [66].
[83] D3, pages 1-2.
[84] D3, page 2, lines 87-113.

90. D3 states that the disclosed compositions are non-volatile and thus do not have the undesirable property associated with ester derivatives of injuring adjacent crops upon volatilisation.[85] The examples demonstrate high activity relative to commercial amine salts and no crop injury.

91. The examples of D3 relate to preparation of herbicidal salt compositions by mixing 2,4-D and other acid herbicides with mixtures of amine bases selected from dimethylamine, diethanolamine, diethylamine and monoethanolamine together with water and other additives.

5.1.1 The 508 application

92. Nufarm submitted that D3 provides a clear and unmistakable disclosure of each and every integer of claims 1-13, consistent with Mr Hay's evidence.[86]

93. Dow submitted that D3 provides insufficient direction to use a tetraalkylammonium cation, no direction to use a tetraalkylammonium hydroxide, and no direction to make an isolated reaction product. Dow also noted that the teaching of D3 was qualified by the requirement that the resulting products must be a liquid at 20°C and have the defined surface tension.

94. The experts agreed that the general disclosure of D3 encompasses choline as the quaternary ammonium salt, however, as indicated above there is a distinction to be drawn between compounds forming part of the "intellectual content" of a citation and those which are "disclosed for novelty purposes". The evidence of the declarants focuses on what is encompassed by the disclosure of D3, which I take to mean what forms part of the intellectual content – this seems to be the most normal and natural meaning of the language. Having reviewed D3 I consider that quaternary ammonium salts of herbicidal carboxylic acids form part of the intellectual content, but are not disclosed for novelty purposes. As noted by Dow, there is a functional limitation on the disclosed salts, and the examples and the described preferred embodiments are limited to primary and secondary amine salts. *Prima facie* there is not a specific disclosure of quaternary ammonium salts and the evidence does not lead me to an alternate view.

95. Accordingly, Nufarm has not established that D3 anticipates the claims of the 508 application.

5.1.2 The 677 application

96. Nufarm submitted that claims 1-7, 9 and 10-12 are anticipated by D3, but for the reasons given above D3 does not anticipate the claims of the 677 application as it lacks a sufficiently clear and unmistakable disclosure of a quaternary ammonium salt of a herbicidal carboxylic acid.

5.2 JP 51-106728

97. JP 51-106728 (**D2**)[87] relates to herbicides with greater selectivity and safer in use than phenoxy-based herbicides, referring in particular to damage to crops associated with use of these herbicides in very cold climates or abnormally low temperatures, and the risk associated with use of high concentrations. D2 discloses herbicides comprising phenoxy-based herbicides (including 2,4-D) and cholines, and states that:

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[85] D3, page 5, lines 79-88.
[86] Annexure PMH-26 to Hay 1.1.
[87] An English translation was provided as Annexure PMH-27 to Hay 1.1, with a declaration by Kyoko Ueno including some corrections provided as Annexure PMH-28 to Hay 1.1.

> "The cholines of the present invention are choline or choline salts. The choline salts of the present invention are for example salts of choline with organic acids such as oxalic acid and ascorbic acid and the like and salts of choline with inorganic acid such as phosphoric acid and carbonic acid and the like.
>
> It is inferred that choline salts of phenoxy substituted lower aliphatic acids are formed when phenoxy substituted lower aliphatic acids are mixed with choline.
>
> Choline is normally widely present in living things, that is, in the bodies of plants and animals, and is an important substance in lipid metabolism and so forth, and is a very stable substance of very low toxicity in plants and animals.
>
> The molar ratio of phenoxy compounds and cholines in the present invention is 1:1 to 1:1.2 and preferably 1:1 to 1:1.1. If the ratio of cholines to phenoxy compounds is less than 1, there is no significant difference from the use of phenoxy compounds alone. Furthermore, if 1.2 is exceeded, the herbicide becomes highly alkaline and the risk of harm increases.
>
> As the salts of the phenoxy substituted lower aliphatic acids and of choline are both highly water soluble, the herbicide envisaged by the present invention can be used a water soluble chemical when salts of both components are used."[88]

98. D2 further states:

> "When broad-leaved weeds are distributed uniformly throughout growing crops, the herbicide envisaged by the present invention very rapidly penetrates the epidermal cells of the plants and reaches the site of action, rapidly killing the broad-leaved weed, while at the same time greatly reducing the risk of chemical damage to the crop."[89]

It is indicated that use of cholines allows for equivalent herbicidal benefits at lower rates of application of the phenoxy-based herbicide, reduced risk of chemical damage, enhanced selectivity and reduced environmental pollution.

99. D2 indicates that the herbicide is produced by mixing together the relevant phenoxy compound, choline, surfactant and water. The practical embodiments of D2 disclose application of the herbicide to crops (e.g. maize and wheat) and weeds (e.g. daikon and beans) together, with herbicidal effect on weeds and no chemical damage to the crops.

100. A practical embodiment containing 2,4-D (referred to as DCP) is disclosed:

DCP	40 parts by weight
Choline	22 parts by weight
Surfactant	3 parts by weight
Water	35 parts by weight

[88] Annexure PMH-27 to Hay 1.1 at page 3. Corrections in Annexure PMH-28 to Hay 1.1 not included.
[89] Annexure PMH-27 to Hay 1.1 at page 5.

5.2.1 The 508 application

101. Nufarm submitted that D2 anticipates claims 1-4 and 7-13. This submission hinges on the question of the construction of choline when no counter ion is referred to and the parties made extensive submissions on this point. Nufarm submitted that this would be understood by the skilled person as a reference to choline hydroxide. In this regard Mr Hay said:

> "It is my view that the reference to choline in D2 means 'choline hydroxide'. It was well known in the field that choline does not exist as a separate entity and that the reference to 'choline' absent a qualifying description of its salt form means that it is referring to 'choline hydroxide'."[90]

102. Nufarm provided a number of references in support of this proposition:

- *Hawley's Condensed Chemical Dictionary*, 12th edition, 1993 which provides the following definition:
  choline. (choline base; *β*-hydroxyethyltrimethylammonium hydroxide).
  CAS: 62-49-7. $(CH_3)_3N(OH)CH_2CH_2OH$.[91]

- *Kirk-Othmer Encyclopedia of Chemical Technology* which identifies choline base as trimethyl(2-hydroxyethyl)-ammonium hydroxide. Notably, this reference later depicts choline as the cation only and seems to distinguish between choline and choline base, for example:

  > "As a therapeutic agent, choline is administered orally in the form of syrups or elixers containing the chloride, citrates or bitartrate… Choline is also given in small doses as a nutritional supplement in combination with a variety of other materials. In dry pharmaceutical-dosage forms, the dihydrogen citrate is usually preferred…
  >
  > In the feeding of animals, choline is often added to chicken and turkey feeds as a dietary supplement…
  >
  > Choline in the form of choline base (hydroxide) is a strong organic base with a pH of approximately 14. This product can have industrial applications where it is important to replace inorganic bases with organic materials."[92]

- *CRC Handbook of Chemistry and Physics*, 58th edition, 1977-1978 which indicates that choline is $(CH_3)_3N^+CH_2CH_2OH.OH^-$ (trimethyl(2-hydroxyethyl)ammonium hydroxide).[93]

- *Handbook of Chemistry and Physics*, 1920[94] and *Handbook of Pharmaceutical Salts: Properties, Selection, and Use*[95] which indicate that the formula of choline is $OH{\cdot}CH_2{\cdot}CH_2{\cdot}N(CH_3)_3{\cdot}OH$.

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[90] Hay 1.1 at [128].
[91] D8 filed with the statement of grounds and particulars (in both oppositions).
[92] D9 filed with the statement of grounds and particulars (in both oppositions).
[93] D11 filed with the statement of grounds and particulars (in both oppositions).
[94] D12 filed with the statement of grounds and particulars (in both oppositions).
[95] D10 filed with the statement of grounds and particulars (in both oppositions).

103. Nufarm further referred to EP 2421372, a patent in the name of Dow relating to salts of glyphosate and 2,4-D, which refers to "Choline hydroxide (Choline)" and US 8877973 which refers to "[c]holine, also known as choline hydroxide".[96] I note that Dow submitted that all of these references were collected by a partisan witness, but I can see no reason to give these documents less weight simply on that basis – it is open to each party in this matter to collect evidence as it considers appropriate.

104. Dow submitted that a reference to choline without any qualification is simply a reference to the cation and the counterion is not disclosed. This is consistent with Dr Wright's evidence:

> "The term choline has a clear and unambiguous meaning and denotes the chemical entity $(CH_3)_3N^+(CH_2CH_2OH)$. Thus, choline is a quaternary ammonium cation, having three methyl residues and one hydroxyethyl residue.
>
> The term choline hydroxide is a clear and precise term and denotes the chemical entity $[(CH_3)_3N^+(CH_2CH_2OH)]OH^-$, i.e. the hydroxide salt of choline.
>
> I, and I believe others in the field, were aware of the meaning of choline being a quaternary ammonium cation. While choline can be coupled with an anion to form a salt, the term choline itself constitutes only the cation. The same is true for other cations, for example, the sodium cation (Na^+). Sodium refers to the sodium cation and not to possible counter ions. It is possible to create different sodium salts with different counter ions, for example sodium chloride (NaCl) or sodium hydroxide (NaOH).
>
> With respect to choline, the term choline only describes the cation and this cation can then be coupled with a suitable counter ion, for example a chloride or a hydroxide ion or any other anion to create a salt. However, the term choline alone does not imply automatically the presence of a hydroxide counter ion, any more than the term sodium does not imply one counter-ion over another."[97]

105. Nufarm submitted that the distinction in D2 between choline and choline salts, and reference to various organic and inorganic acid salts, is "clearly a description of the reaction between choline hydroxide (base) and various acids to produce various (choline) salts."[98] Dow noted that choline hydroxide is itself a choline salt[99] and Dr Wright understood the reference in D2 to be to choline *per se*, the cation, or choline salts (other than hydroxide, which is not explicitly mentioned).[100] I have some difficulty with understanding choline in this context as the cation *per se*, given that the cation does not exist in a practical sense in isolation. However, I also do not consider this to be unambiguously an indication that subsequent references to choline are to choline hydroxide.

106. In this regard, Dow noted the reference in D2 to choline "being widely present in living things" and submitted that this cannot be a reference to choline hydroxide, which according to Dr Wright is not found in biological systems.[101]

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[96] See Hay 1.1 at [128].
[97] Wright 1 at [97]-[100], also Wright 2 at [80]-[83].
[98] Nufarm's 508 submissions of 31 July 2019 at [76].
[99] Dow's submissions of 7 August 2019 at [89].
[100] Wright 1 at [103].
[101] Wright 1 at [108].

107. It is apparent from the documents referred to by Mr Hay that choline can be used as a shorthand for choline free base or hydroxide. I am not persuaded, though, that the documents establish that this was so ubiquitous in the art that a skilled person would necessarily understand this to be the case in D2 based simply on this use of language. In this regard I find Dow's submission that the existence of two terms with clear and separate meanings is indicative of their differing meanings, that is, choline is plainly capable of meaning something other than choline hydroxide (e.g. the choline cation), persuasive.

108. Nufarm further submitted, having regard to the practical embodiments of D2 and Mr Hay's calculations,[102] that the preferred ratio of phenoxy compound:choline (i.e. 1:1 to 1:1.2) is only achieved if the choline is choline hydroxide. *Prima facie* there is some force to this submission. Dow responded that the reference in the practical embodiments may be to the amount of choline cation that is to be added (i.e. irrespective of the counterion), which would also give rise to the preferred ratio.[103] Furthermore, Dow noted that if choline is understood as choline hydroxide, the ratio in practical embodiment 4 is less than 1:1, which is said in D2, albeit somewhat surprisingly, to give "no significant difference from the use of phenoxy compounds alone."

109. Nufarm provided evidence of a series of experiments wherein each of choline hydroxide, chloride and bitartrate were reacted with 2,4-D at 1:1 and 1:1.3 molar ratios. A clear aqueous solution formed upon reaction of 2,4-D with choline hydroxide, but no reaction occurred at either ratio with choline chloride or bitartrate.[104] In Nufarm's submission this clearly demonstrates that the choline of D2 is choline hydroxide.

110. Clearly there are ambiguities associated with the disclosure of D2, but there are considerations that support a conclusion that the choline referred to in the practical embodiments is choline hydroxide. However, while this was a matter of contention at the hearing, it is not necessary for me to form a concluded view on this point for the purpose of resolving the novelty ground.

111. Dow submitted that there is no disclosure of an isolation step in D2, and given that such a step is a requirement of each claim, it follows that in Dow's submission D2 does not anticipate the claims. While agreeing that D2 does not explicitly disclose an isolation step, Nufarm submitted that a skilled person would understand that to be an inherent part of producing the compounds and Mr Hay noted that an isolation step of separating the compound of interest from solution was "routine" and "certainly undertaken as a technique used in 1976"[105] and would be required to market the compound in Japan.[106] Dow submitted that it was plainly not inherent because in the examples of D2 a mixture is simply formed and applied. Given the manner in which the compositions of D2 are prepared and applied (that is, "specified amounts of phenoxy compounds, choline, surfactant and water were mixed together to form the herbicide"[107] and either "the herbicide" or diluted herbicides were applied to crops), I agree with Dow that there is no clear and unmistakable direction in D2 to undertake an isolation step.

112. Nufarm has not established that D2 anticipates the claims of the 508 application.

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[102] Hay 1.1 at [129]-[130].
[103] Dow's submissions of 7 August 2019 at [86].
[104] McKerrow 1.
[105] Hay 1.1 at [134].
[106] Annexure PMH-30.
[107] Annexure PMH-27 to Hay 1.1 at page 6.

5.2.2 The 677 application

113. Nufarm submitted that claims 1, 2, 4, 7-10 and 12 are anticipated by D2, and given my construction of the claims I am satisfied that D2, which explicitly refers to the formation of choline salts, discloses the defined reaction product. The question is whether D2 discloses a method in which the herbicide is applied to a locus of unwanted vegetation but not a crop that neighbours that locus.

114. Nufarm submitted that to the extent this is not disclosed it is inherent in the clear and unmistakable directions to administer the herbicide and the inherent lack of volatility of the choline salt of 2,4-D.[108] Dow submitted that the focus of D2 is solely on the prevention of injury to a crop amongst which broadleaf weeds are interspersed.[109]

115. I am inclined to agree with Dow on this point. D2 refers to the greater selectivity of the disclosed herbicide and exemplifies its application to a mixture of crop and weed plants.[110] While I accept that a person following the teaching of D2 *could* arrive at the method of the present claims, it would appear to be at least as likely that they would not. Accordingly, Nufarm has not established that the claims are not novel in light of D2.

5.3 DD 203677

116. DD 203677 (**D1**)[111] states that the invention relates to media for influencing the organ ratio in cultivated plants. Specifically, it is an object of the invention to develop a media that changes the organ ratio in favour of the main harvest product and improves the water utilisation with respect to the yield. As background to the invention, D1 indicates that combinations of 2,3-dichloroiso-butyrate with chlorocholine chloride and/or 2,4-D beneficially influence the leaf/root ratio of root crops, but desirable results are weather-dependent. It is also noted that high concentrations of chlorocholine chloride involve toxicological problems in utilisation of the beet leaf.

117. Solutions containing choline (I), optionally ethanolamine (II), 2,4-dichlorophenoxy carboxylic acids or esters thereof (III) and/or dichloroisobutyric acid or salts thereof (IV) are disclosed, and, relevantly, combinations of choline and 2,4-D are demonstrated to improve grain yield in barley and fresh beet mass in sugar beet relative to a control. D1 also discloses that solutions of choline alone provide an improvement relative to a control.

5.3.1 The 508 application

118. Like in relation to D2, Nufarm submitted that the reference to choline in D1 would be understood as a reference to choline hydroxide and that the claims are therefore anticipated by D1. In addition to the references set out above with respect to the understanding of choline, Nufarm provided German texts defining "cholin" as recited in the original German document:

    - *Beilstein Handbuch der Organische Chemie* recites: "Trimethyl-[β-oxy-äthyl]-ammoniumhydroxyd, Cholin. $C_5H_{15}O_2N = (CH_3)_3N(OH)\cdot CH_2\cdot CH_2\cdot OH$"[112]

[108] Nufarm's 677 submissions of 31 July 2019 at [65].
[109] Dow's submissions of 7 August 2019 at [95].
[110] Practical embodiment 3 relates to application to plots in a weed-grown field but this appears to be for the purpose of demonstrating efficacy in cold temperatures.
[111] An English translation was provided as Annexure PMH-31 to Hay 1.1.
[112] D25 filed with the statement of grounds and particulars in the 508 opposition; Annexure PMH-25 to Hay 2.1.

- *Römpp Chemie Lexikon* indicates that cholin is [(2-hydroxyethyl)-trimethylammoniumhydroxid][113]

119. Ultimately, the same considerations apply as set out above in relation to D2. That is, evidently choline (or cholin) alone may be used as a reference to choline hydroxide. The question is whether the context of D1 is such that it is more likely than not to be being so used. In this regard, as noted above D1 refers to the application of choline alone providing a beneficial outcome, which Dow submitted would not be expected upon application of the caustic choline hydroxide. Given the discussion of the uses of choline hydroxide referred to in the *Kirk-Othmer Encyclopedia of Chemical Technology* recited above, I am inclined to agree with Dow on this point. I also note that D1 does not refer to the formation of a choline salt of 2,4-D, but to the combination of various components which also individually exhibit the desired outcome. Accordingly, on balance I do not consider that D1 provides clear and unmistakable directions to the use of choline hydroxide as required by the present claims.

120. Dow also suggested, noting the references to chlorocholine chloride as having a useful effect on leaf/root ratios in the background section of D1, that another possible reading is that later references to choline are shorthand for chlorocholine chloride. While I can accept that this is a possibility, none of the declarants appear to have engaged with this point which suggests that such a reading would not obviously present itself to the notional skilled person.

121. Further, like D2, D1 does not explicitly disclose an isolation step and while Nufarm echoed the submission made in relation to D2 in this regard, there is no teaching I can identify in D1 towards the preparation of an isolated salt – the specification is directed towards media comprising particular active agents and mixtures thereof, which is sprayed onto the crop of interest.

122. Nufarm has not established that D1 anticipates the claims of the 508 application.

5.3.2 The 677 application

123. Nufarm submitted that claims 1, 2, 4, 7, 9 and 12 are not novel in light of D1. While the media of D1 contains 2,4-D, which inherently has herbicidal properties, D1 is directed to its application to favour a harvest product and improve water utilisation. Nufarm submitted that "this does not mean that [the 2,4-D choline solutions] do not in fact comprise herbicidal compounds, and could not be used to kill weed species at the appropriate dosage levels"[114] and that to the extent that herbicidal activity is defined in the present specification as encompassing "deviations from natural development", influencing the organ ratio is a herbicidal activity.[115] On this latter point I cannot agree with Nufarm. The definition in the specification makes clear that a herbicidal effect is an *adversely* modifying effect and this is clearly not the type of effect to which D1 is directed. Furthermore, while I accept that the media of D1 *could* be used at herbicidal dosages, D1 does not provide clear and unmistakable directions to such a use.

124. Nufarm has not established that D1 anticipates the claims of the 677 application.

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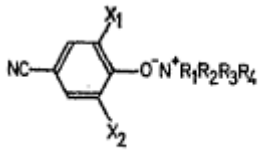
[113] D27 filed with the statement of grounds and particulars in the 508 opposition; Annexure PMH-26 to Hay 2.1.
[114] Nufarm's 677 submissions of 31 July 2019 at [89].
[115] Nufarm's 677 submissions of 31 July 2019 at [92].

5.4 GB 1,056,235

125. GB 1,056,235 (**D25**/**D28**[116]) explains that 4-hydroxybenzonitrile derivatives possess herbicidal properties "particularly in the selective control of broad-leafed annual weeds in graminaceous crops"[117] and the disclosure relates to compositions comprising quaternary ammonium derivatives of herbicidal benzonitriles with high water solubility. In particular, the document relates to tetraalkylammonium derivatives of benzonitriles of formula II wherein the alkyl substituents are selected from methyl and ethyl, with a preference for tetramethylammonium derivatives.



II

126. Two methods of preparing these derivatives are disclosed: reaction of a benzonitrile salt with a quaternary ammonium bromide or chloride in a solvent such as an alcohol and reaction of a benzonitrile with a quaternary ammonium hydroxide in a solvent such as water.[118] The examples describe preparation of tetramethylammonium derivatives by the former method.

127. The document indicates that other herbicidally active compounds may be included in the compositions of the invention and "[p]referred mixtures of the invention contain quaternary ammonium derivatives of known phenoxyalkanoic acids."[119] Preferably, these other herbicidally active compounds have the same quaternary groups as the benzonitrile component. Preparation of these derivatives is not specifically discussed, but example III describes preparation of the tetramethylammonium salt of 2,4-D by reaction of tetramethylammonium chloride and the sodium salt of 2,4-D in refluxing ethanol followed by filtration and evaporation of ethanol to yield the solid salt.

128. The benzonitrile derivatives are said to be particularly suitable for application to crop-growing areas, that is, areas on which crops are or will be growing and crops suitable for treatment are identified. Administration to fallow land is also disclosed and may be at a higher dosage. Undesired vegetation in crop-growing areas (plantations, orchards, vineyards) may also be treated by directional application, particularly spraying.[120] With respect to mixtures with phenoxyalkanoic acids, the document states that:

> "according to another aspect of the invention, there is provided a method for the post-emergent control of annual and perennial broad-leafed weeds growing in an arable tract of land, which contains, or will contain, a useful crop as hereinbefore specified, which comprises spraying aerial or exposed parts of the weeds with a herbicidal composition containing as a first component a quaternary ammonium derivative of formula II together with, as a second component, a quaternary ammonium derivative of a known phenoxyalkanoic acid selective herbicide…"[121]

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[116] This document has been referred to as D28 in the opposition to the 508 application and D25 in the opposition to the 677 application.
[117] D28, page 1, lines 16-18.
[118] D28, page 4, lines 3-33.
[119] D28, page 4, lines 88-90.
[120] D28, pages 2-3.
[121] D28, page 4, lines 90-103.

5.4.1 The 508 application

129. Nufarm submitted that claims 1-4 and 8-13 are not novel in light of D28. Specifically, Nufarm submitted that D28, when the totality of the disclosure is considered, clearly and unmistakably discloses phenoxyalkanoic anions with quaternary ammonium cations having ethyl or mixed ethyl and methyl substituents and teaches that the quaternary ammonium herbicides may be prepared from quaternary ammonium hydroxides.

130. Dow submitted that the method in D28 teaches neither the use of a hydroxide salt nor its reaction with a carboxylic acid (the exemplified method uses the sodium salt of 2,4-D), and that further, the exemplified tetramethylammonium is excluded from the scope of the claims. Dow also submitted that to the extent the document provides a disclosure other than that of example III, there is no direction to perform the required isolation step.

131. I have set out previously the requirement for a novelty destroying disclosure to be of the "accuracy of a sniper". I am not satisfied that D28 meets that requirement. What is exemplified differs from the present claims with respect to both the nature of the alkyl substituents and the counter ion. While D28 refers generally to methods of production of quaternary ammonium salts of herbicidal benzonitriles, I have not identified and the parties have not pointed me to any passage in D28 that could be considered a clear, explicit and specific teaching to produce a salt of 2,4-D by reaction of the acid with a tetraalkylammonium hydroxide within the scope of the present claims. Nufarm has not established that the claims lack novelty in light of D28.

5.4.2 The 677 application

132. Notably D25 discloses a tetramethylammonium salt of 2,4-D which, given my construction of the claims, is a reaction product as defined in claim 1. Nufarm submitted that to the extent the defined method is not disclosed it is inherent in the directions to administer the herbicide and the inherent lack of volatility of the choline salt of 2,4-D.[122] Dow submitted that there is no direction to use a relevant composition in a method according to claim 1.

133. As set out above, D25 refers to directional spraying, which I understand to refer to administration directed specifically to a weed rather than a crop, of the disclosed benzonitrile derivatives in the context of spraying undesired vegetation in crop-growing areas such as orchards and vineyards. The discussion of the use of the herbicidal combinations comprising phenoxyalkanoic acids refers to spraying of aerial or exposed parts of weeds in an arable tract of land which does or will contain a useful crop. Claim 32, a dependent claim of D25 which relates to the use of the combination of benzonitrile and phenoxyalkanoic acid refers to application to a crop-growing area "at a rate sufficient to control the growth of weeds without substantial permanent damage to the crop" suggesting that it is applied, albeit in a low dose, to the crop. There is no exemplification of administration of the herbicide mixtures of D25.

134. The question to my mind is whether D25 provides sufficiently clear and unmistakable directions to use a composition comprising a quaternary ammonium salt of a herbicidal carboxylic acid in the manner defined in claim 1, such as directional spraying. It is unfortunate that the evidence does not address this point unambiguously.[123] While there is no specific reference to use of the combination disclosed in D25 in directional spraying, given that the focus of the document is on

[122] Nufarm's 677 submissions of 31 July 2019 at [109].

[123] I note that in Annexure PMH-24 to Hay 1.1 Mr Hay refers to the passage of D25 relating to directional spraying in relation to a composition comprising a 2,4-D salt.

new derivatives of herbicides rather than their administration a great level of detail regarding administration would not be expected. However, given the earlier reference to directional spraying, this would seem to be within the scope of what a skilled person would understand from the reference to spraying the combination on aerial or exposed parts of weeds. While D25 indicates phenoxyalkanoic acids have a different spectrum of activity to benzonitriles, it is not apparent that this would change the skilled person's understanding – both herbicides are selective for broadleaf weeds. On balance, I consider that D25 provides sufficiently clear and unmistakable directions to apply the disclosed herbicidal carboxylic acid salt containing combinations to weeds and not a neighbouring crop to anticipate claim 1. Given the specific disclosure of the tetramethylammonium salt of 2,4-D it follows that claims 2, 3 and 6 are also anticipated. Claims 8 and 12 are also not novel given that D25 discloses treatment of broadleaf weeds and refers to directional spraying in a vineyard (which I understand as a disclosure of the crop being grapes). I am not satisfied that there is a sufficiently clear teaching of the subject matter of the remaining claims (the specific ammonium substituents and the defined crops in the context of application of the herbicide to the weed only and not the neighbouring crop).

5.5 US 2,900,411

135. US 2,900,411 (**D24**) relates to fatty amine salts of plant hormone carboxylic acids, such as 2,4-D. D24 sets out a number of objects, including "to provide a plant hormone herbicide which is insoluble in water but which nevertheless may readily be dispersed or suspended in water or other media for easy application to crops or soil."[124] It is indicated that:

> "by reacting an aliphatic amine having at least 6 carbon atoms in an aliphatic radical thereof with a plant hormone carboxylic acid to form the salt of these two substances, we are able to obtain a highly insoluble herbicide possessing all of the above advantages."[125]

136. Examples of plant hormone carboxylic acids are provided:

> "auxin, which is widespread throughout the plant kingdom; 2,4-dichlorophenoxy-acetic acid (commonly referred to as 2,4-D); β-indolylacetic acid; α-naphthaleneacetic acid; indolylbutyric acid; indolylpropionic acid; phenylacetic acid; and fluorine acetic acid."[126]

137. In relation to the aliphatic amine it is further stated:

> "It will be understood that such aliphatic amines include any straight or branched carbon chain, primary, secondary or tertiary aliphatic amines, as well as the quaternary amines or quaternary ammonium compounds, having the requisite number of carbon atoms in the aliphatic radicals thereof. … Examples of the amines which may be used are: primary amines, such as dodecylamine, tridecyl-amine, tetradecylamine, pentadecylamine, hexadecylamine, heptadecylamine, and octadecylamine; secondary amines, such as didodecylamine and dioctadecylamine; tertiary amines, such as tridodecylamine; and quaternary compounds, such as tri-methyloctylammonium hydroxide and trimethyldodecylammonium hydroxide."[127]

[124] D24, column 1, lines 61-65.
[125] D24, column 2, lines 3-8.
[126] D24, column 1, lines 31-35.
[127] D24, column 2, lines 17-33.

138. The examples of D24 are directed to the preparation of salts of 2,4-D and phenoxyacetic acid with primary, secondary and tertiary amines; there is no exemplification of a salt with a quaternary ammonium. D24 provides a general indication that the salts may be prepared in any suitable manner, and for example, "the two substances may be mixed in a solvent and warmed until a homogeneous solution is obtained and then cooled until precipitation of the desired salt is complete, after which it may be filtered and dried."[128]

5.5.1 The 508 application

139. Nufarm submitted that claims 1-4, 8 and 10-13 are anticipated by the disclosure of D24, which discloses each essential integer of these claims: that is, a herbicide produced by reaction of 2,4-D with a tetralkylammonium hydroxide and subsequently isolated.[129]

140. Dow submitted that D24 encompasses a very large number of compounds (aliphatic amines wherein the aliphatic radical has at least six carbon atoms) and there is insufficient teaching towards the presently claimed compounds. In this regard, Dow submitted that there is no clear teaching (in the form of data) that the compounds of D24 are effective herbicides, the direction does not extend beyond the six salts taught in the examples, or the three listed in the dependent claims of D24: octadecylamine, tallow amine and didodecylamine, and there is no advantage in respect of quaternary ammoniums taught by the document. Dow further submitted that the teaching of D24 was not simply to any salts, but to insoluble salts.

141. I accept Dow's point regarding the expansive nature of the general disclosure of D24, and I am inclined to agree that it cannot be said that D24 identifies quaternary ammonium salts other than the specifically named trimethyloctylammonium hydroxide and trimethyldodecylammonium hydroxide with the requisite specificity. Accordingly, to my mind the key question is whether 2,4-D salts produced by reaction with these specifically named ammonium salts are disclosed with adequate specificity.

142. While 2,4-D as the plant hormone carboxylic acid and trimethyloctylammonium hydroxide and trimethyldodecylammonium hydroxide as the aliphatic amine are each specifically identified in D24, this is among multiple other plant hormone carboxylic acids and aliphatic amines. There is no specific direction to a quaternary ammonium salt of 2,4-D in particular, and to my mind, the specific combination of 2,4-D with the specified quaternary ammonium salts, while forming part of the "intellectual content" of the disclosure, is not disclosed for novelty purposes – this is akin to the "flag which the prior art document possessed and could have planted" rather than an actual planting of the flag. On balance, I am not satisfied that the claims are anticipated by D24.

5.6 Conclusion on novelty

143. Nufarm has not made out the ground of novelty in relation to the 508 application. Claims 1-3, 6, 8 and 12 of the 677 application are not novel in light of D25.

6. Inventive step

144. Subsection 7(2) states that an invention is taken to involve an inventive step unless it would have

[128] D24, column 2, lines 42-45.
[129] Consistent with Mr Hay's novelty table: Annexure PMH-25 to Hay 1.1.

been obvious to a person skilled in the art in light of the common general knowledge (whether in or out of the patent area) before the priority date of the relevant claim when considered alone or together with the information mentioned in subsection 7(3).

145. Subsection 7(3) defines the relevant information as:

> The information for the purposes of subsection (2) is:
> (a) any single piece of prior art information; or
> (b) a combination of any 2 or more pieces of prior art information that the skilled person mentioned in subsection (2) could, before the priority date of the relevant claim, be reasonably expected to have combined.

146. Having identified the common general knowledge and any relevant information as defined in subsection 7(3), the test for whether an invention is obvious is to ask whether it would have been a matter of routine to proceed to the claimed invention, as set out by Aickin J:

> "The test is whether the hypothetical addressee faced with the same problem would have taken as a matter of routine whatever steps might have led from the prior art to the invention, whether they be the steps of the inventor or not."[130]

147. The High Court in *Aktiebolaget Hässle v Alphapharm Pty Ltd*[131] (***Alphapharm***) approved this approach, noting that matters of routine are to be distinguished from other courses of action:

> "The tracing of a course of action which was complex and detailed, as well as laborious, with a good deal of trial and error, with dead ends and the retracing of steps is not the taking of routine steps to which the hypothetical formulator was taken as a matter of course."[132]

148. The plurality in *Alphapharm* also approved the approach taken in *Olin Mathieson Chemical Corporation v Biorex Laboratories Ltd*[133] of asking whether the person skilled in the art would be directly led as a matter of course to try what was claimed in the expectation that it might well produce a useful or desired result.[134]

149. In both approaches a person skilled in the art must have a reasonable expectation of success. This is explicit in the expectation that an approach "might well" succeed, and implicit in the characterisation of steps as those to be taken as a matter of routine,[135] but this expectation does not require that success is guaranteed: "the relevant test is not knowing that steps will or would or even may well work, but merely expecting that the steps may well work."[136] Further, it is possible that the skilled person might be directly led to try more than one alternative expecting that each may well produce a useful or desired result.[137]

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[130] *Wellcome Foundation Ltd v V.R. Laboratories (Aust.) Pty Ltd* [1981] HCA 12; 148 CLR 262 at 286.
[131] [2002] HCA 59; 212 CLR 411 at 432-433, [50]-[52].
[132] *Alphapharm* at 436, [58].
[133] [1970] RPC 157 at 187.
[134] *Alphapharm* at 433, [53].
[135] *Generic Health Pty Ltd v Bayer Pharma Aktiengesellschaft* [2014] FCAFC 73; 314 ALR 91 at [71].
[136] *Nichia Corporation v Arrow Electronics Australia Pty Ltd* [2019] FCAFC 2 at [99].
[137] *Mylan Health Pty Ltd (formerly BGP Products Pty Ltd) v Sun Pharma ANZ Pty Ltd (formerly Ranbaxy Australia Pty Ltd* [2019] FCA 28 at [192]; *Nichia Corporation v Arrow Electronics Australia Pty Ltd* [2019] FCAFC 2 at [91]-[93].

150. Principles identified by the High Court in *Lockwood Security Products Pty Ltd v Doric Products Pty Ltd (No 2)* as of "continuing relevance" in relation to inventive step include:

> "…obviousness and inventiveness are antitheses and the question is always 'is the step taken over the prior art an "obvious step" or "an inventive step"'? An inventive step is often an issue 'borne out by the evidence of the experts'. There is no distinction between obviousness and lack of inventive step. A 'scintilla of invention' remains sufficient in Australian law to support the validity of a patent. In *R D Werner* Lockhart J stated that there must be 'some difficulty overcome, some barrier crossed'. This is consonant with older authorities in the United Kingdom which recognised that some inventiveness was required to distinguish patentable advances over the prior art from advances which 'any fool' could devise. It also accords with the requirement in the United States that for an invention to be 'non-obvious' it must be 'beyond the skill of the calling'."[138]

151. However, I note that the plurality in *Alphapharm* referred with approval[139] to the observations of Judge Rich in *In re O'Farrell*[140] in rejecting an "obvious to try" approach to inventive step:

> "The admonition that 'obvious to try' is not the standard under §103 has been directed mainly at two kinds of error. In some cases, what would have been 'obvious to try' would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful. … In others, what was 'obvious to try' was to explore a new technology or general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it."[141]

6.1 Common general knowledge

152. Common general knowledge is the background knowledge and experience available to all those working in the relevant art:

> "The notion of common general knowledge itself involves the use of that which is known or used by those in the relevant trade. It forms the background knowledge and experience which is available to all in the trade in considering the making of new products, or the making of improvements in old, and it must be treated as being used by an individual as a general body of knowledge."[142]

153. However, it is not enough that information is recorded in a document, even if that document is widely circulated – it is only part of the common general knowledge when it is generally known and accepted:

> "information does not constitute common general knowledge merely because it might be found, for example, in a journal, even if widely read by persons in the art

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[138] [2007] HCA 21; 235 CLR 173 at [52].
[139] *Alphapharm* at 442-443, [76].
[140] (1988) 853 F 2d 894.
[141] Ibid at 903 (citations omitted).
[142] *Minnesota Mining & Manufacturing Co v Beiersdorf (Australia) Ltd* [1980] HCA 9; 1A IPR 231 at 255-256.

> … Reference in this regard is made to the words of Luxmoore J in *British Acoustic Films* (1936) 53 RPC 221 at 250, cited by Lehane J in *Aktiebolaget Hässle v Alphapharm Pty Ltd* (1999) 44 IPR 593; [1999] FCA 628 at 605 [39]:
>
> > *In my judgment it is not sufficient to prove common general knowledge that a particular disclosure is made in an article, or series of articles, in a scientific journal, no matter how wide the circulation of that journal may be, in the absence of any evidence that the disclosure is accepted generally by those who are engaged in the art to which the disclosure relates. A piece of particular knowledge as disclosed in a scientific paper does not become common general knowledge merely because it is widely read, and still less because it is widely circulated. Such a piece of knowledge only becomes general knowledge when it is generally known and accepted without question by the bulk of those who are engaged in the particular art; in other words, when it becomes part of their common stock of knowledge relating to the art.*"[143]

154. The evidence (substantially the same information is present in both oppositions) establishes that the common general knowledge at the priority date included the knowledge that:

- 2,4-D was a commonly used herbicide in both cropping and non-cropping situations. Aerial, handheld and ground methods of application were used.[144]
- 2,4-D was initially manufactured as a relatively insoluble free acid, and then converted into a more water miscible form for supply. Two common approaches were used: reaction of the 2,4-D acid with an alcohol to form an ester or formation of a water soluble salt.[145]
- Sprayed herbicides can drift as droplets, vapours and/or particles.[146]
- Ester forms of 2,4-D exhibited volatility problems, and extra care was needed to prevent off-target movement to nearby sensitive plants.[147]
- Amine salts of 2,4-D had reduced volatility relative to esters.[148]
- Volatility of compounds, at least within a class of compounds, tends to reduce with increasing molecular weight.[149]
- It was possible to induce tolerance or resistance to 2,4-D in crops by genetic manipulation or selective breeding.[150]
- Quaternary ammonium salts were readily available and commonly used as disinfectants, surfactants, fabric softeners and anti-static agents. Synthesis and properties of these compounds was well known.[151]

155. Nufarm also submitted that it was common general knowledge that quaternary ammonium compounds could readily be formulated to form the corresponding salt of 2,4-D using standard

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[143] *Ranbaxy Laboratories Limited v AstraZeneca AB* [2013] FCA 368; 101 IPR 11 at [217].
[144] Hay 1.1 at [29], Hay 2.1 at [29], Annexure PMH-11 (annexed to Hay 1.1 and Hay 2.1).
[145] Hay 1.1 at [30]-[34], Hay 2.1 at [30]-[34], Wright 1 at [31], Wright 2 at [30].
[146] Hay 1.1 at [39], Hay 2.1 at [39], Wright 1 at [33]-[36], Wright 2 at [32]-[35].
[147] Hay 1.1 at [35]-[38], Hay 2.1 at [35]-[38], Wright 1 at [32], Wright 2 at [31].
[148] Hay 1.1 at [42], Hay 2.1 at [42], Wright 1 at [37], Wright 2 at [36].
[149] Hay 1.1 at [46], Pearson at [42].
[150] Hay 1.1 at [59], Hay 2.1 at [51], Annexure PMH-19 to Hay 1.1, Annexure PMH-20 to Hay 1.1, Annexure PMH-17 to Hay 2.1, Annexure PMH-18 to Hay 2.1.
[151] Hay 1.1 at [47], [49]-[50], Hay 2.1 at [46], [48], Wright 1 at [62], Wright 2 at [50], [53], Hay 2.2 at [79].

laboratory techniques.[152] However, to the extent that this submission advances beyond the proposition that a skilled person was generally aware of how to produce quaternary ammonium salts of various compounds, it is not supported by the evidence.[153]

6.2 The problem

156. In *AstraZeneca AB v Apotex Pty Ltd*[154] the majority of the Full Court held that in formulating the problem it is impermissible to incorporate information that is not available to the skilled person either as common general knowledge or information available under s 7(3).

157. I understand Dow's submission to be that the problem addressed by the specification is the further reduction of volatility of 2,4-D derivatives relative to the commercially available amine salts. This accords with what the specification sets out as the problem.

158. Nufarm submitted that the problem asserted in the specification of the volatility of 2,4-D esters, was in fact not a problem, having been already overcome by the use of amine salts of 2,4-D. Nufarm further observed with respect to the 508 application that there is no connection between the asserted volatility problem and the claims – that is, the claims do not refer to the problem and the process of production set out in the claims does not contribute to its solution. Accordingly, Nufarm submitted that the problem would be better characterised as one of producing new herbicidal compounds. However, I do not understand there to be any dispute that the products produced by the process set out in the claims are presented as herbicidal compounds that have low volatility. It is not unusual for claims to be directed to compositions or compounds *per se* which, absent some practical use described in the specification but not necessarily recited in the claim, would be considered unpatentable chemical curiosities. I do not see this as being material to the formulation of the problem in this case.

159. Dr Wright indicated that amine salts of 2,4-D are not totally non-volatile, and that "the potential problem of vapor drift still existed at the Relevant Date, even if amine salts were utilized."[155] This is consistent with the explanation of the invention provided by Dr Pearson and discussed previously. Mr Hay indicated that this was not supported by the literature, in particular referring to an article titled 'Volatilization of various esters and salts of 2,4-D' published in *Weed Science*[156] which states:

> "…if vapor drift is important for 2,4-D type compounds, that this can be essentially eliminated by the use of amine salts instead of esters, as the volatilities of salts measured here even with no formulation materials present, and using an unrealistically high Q value, are less than 10% after 48 hr, by which time most of the salt impacted on plant leaves will have been absorbed."

160. However, I do not understand this passage as saying vapor drift is reduced to zero or that there is no prospect for further improvement and in my view this understanding is supported by, for

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[152] Nufarm's 508 submissions of 31 July 2019 at [161], Nufarm's 677 submissions of 31 July 2019 at [130].
[153] Mr Hay refers at [54] of Hay 1.1 and [49], [64] of Hay 2.1 to the n-tetradecylamine salt of 2,4-D, which is not a tetraalkylammonium salt and there is no evidence that Annexure PMH-18, referred to in Hay 1.2 at [28], was part of the common general knowledge.
[154] [2014] FCAFC 99; 107 IPR 177 at [202]-[203].
[155] Wright 2 at [47].
[156] Annexure PMH-15 to Hay 1.1 - Que Hee, S.S. and Sutherland R.G. 'Volatilization of various esters and salts of 2,4-D' *Weed Science* (1974) vol. 22, pages 313-318.

example, the statement in the APVMA report titled 'The reconsideration of approvals of the active constituent 2,4-D, registrations of products containing 2,4-D and their associated labels. Preliminary Review Findings (Environment) Part 1: 2,4-D Esters' that "2,4-D alkali salts or amine salts are much less volatile than esters".[157] That is, the report does not refer to total absence of volatility. Further, as Dow noted, the present specification indicates that there are still detrimental effects associated with the amine salts, notwithstanding their reduced volatility, consistent with the evidence of Drs Wright and Pearson.[158]

161. Accordingly, I consider that the problem solved by the specification is the production (and use) of herbicidal carboxylic acid, particularly 2,4-D, derivatives with reduced volatility as described and exemplified in the specification. I consider that the problem is the same with respect to both specifications under consideration, notwithstanding that the 508 application primarily defines a product (by process) and the 677 application defines a method relying on the reduced volatility of the herbicidal carboxylic acid derivatives.

162. While there is, post-*Raising the Bar*, no requirement in section 7 for inventive step documents to be ascertained, understood and regarded as relevant, the problem remains relevant to the consideration of the prior art base. The Explanatory Memorandum makes clear that the question remains whether a skilled person *faced with the same problem* would have taken routine steps to arrive at the claimed invention:

> "While a skilled person is essentially deemed to be aware of and to have carefully read the publically available information, the inventive step tests are otherwise applied in the context of what the skilled person would have known and done before the priority date of the claims in question. The tests will therefore continue to take account of factors such as whether the skilled person would have understood and appreciated the relevance of the prior art to the problem the invention was seeking to solve and whether it would be considered a worthy starting point for further investigation or development."[159]

163. Accordingly, notwithstanding the manner in which the present claims are formulated, I consider that if a person would not appreciate a prior art document to be a reasonable starting point in seeking to solve the problem identified above, then they would not be expected to take routine steps from that point. This is consistent with the tests approved by the High Court.

6.3 Inventive step in light of the common general knowledge alone

6.3.1 The 508 application

164. Nufarm submitted that to the extent that there was a relevant problem associated with vapour drift, a skilled person would have been led as a matter of course to make and use higher molecular weight primary, secondary and tertiary amines and quaternary ammonium salts of 2,4-D with the expectation that such salts might well provide a solution to the problem. Nufarm emphasised that where there are multiple routine pathways all those pathways are obvious, and so the fact that multiple salts might be obvious is not a basis for finding a particular salt inventive.

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[157] Annexure PMH-11 to Hay 2.1 at page 30.
[158] Pearson at [44]-[45]; Wright 1 at [46]-[48]; Wright 2 at [45]-[47].
[159] Explanatory Memorandum, Intellectual Property Laws Amendment (Raising the Bar) Bill 2011 (Cth) at page 43.

165. Mr Hay's evidence was that he would have considered amine salt forms when faced with the problem of reducing the volatility of 2,4-D:

> "if I had been faced with the task in February 2007 of reducing the volatility of the carboxylic acid 2,4-D so that its use would not damage nearby sensitive crops while maintaining an acceptable level of the herbicidal activity in controlling unwanted vegetation I would have immediately looked at an amine salt form. Given the known problems associated with dimethylamine salt form, I would have immediately considered changing to another less volatile amine such as a diethanolamine, triethanolamine or triisopropanolamine to reduce the risks of volatility and prevent injury to nearby sensitive crops. …I would have also considered using quaternary ammonium compounds such as the quaternary ammonium hydroxide form as they were known before February 2007 to have a base strength comparable to sodium hydroxide (**PMH-14** and **D9**); known that they could form a salt with 2,4-D (**PMH-17** and **PMH-18**) and known that vapour drift could be eliminated by use of such salts (**PMH-15**). In my opinion there would have been no grounds to exclude quaternary amine from the equation."[160]

> "…I would not have ruled out the use of other amine salts such as quaternary ammonium salts. There is simply no basis to do so particularly given that the processes used to prepare a quaternary ammonium salt form of 2,4-D by neutralization of 2,4-D with a quaternary ammonium hydroxide in aqueous solution would not involve complicated laboratory techniques. In my opinion **all** salts of 2,4-D, including quaternary amine salts, would have been considered in any research program. In fact, it would be highly unusual to reject a class of salts simply because they may not have been in wide use or even in commercial use or more expensive or more difficult to make."[161]

166. Dow submitted that quaternary ammonium salts were not in use or known to be useful in addressing vapour drift and referred to the evidence of Dr Wright that quaternary ammonium salts are more expensive and difficult to produce than primary, secondary and tertiary amine salts.[162]

167. It is useful to recall that Mr Hay's evidence was given with an awareness that the claimed invention is directed to quaternary ammonium salts of 2,4-D, and I note the comments of Middleton J, referred to by Dow to support the submission that caution must be applied in considering Mr Hay's evidence as to obviousness, that:

> "even the most honest and competent witnesses will tend to exaggerate what could have been anticipated once they have the advantage of knowing of the invention and the process involved in reaching that invention."[163]

168. Bearing this in mind, I conclude from the evidence that a skilled person would have understood that amine salts would provide a less volatile form of 2,4-D, and while such a person undertaking an investigation of all amine salts of 2,4-D would not have had any technical reason to actively exclude quaternary ammonium salts, those salts would not have been at the front of the skilled person's mind. While of course a skilled person may be directly led to multiple obvious solutions

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[160] Hay 1.1 at [63].
[161] Hay 1.2 at [131].
[162] Wright 1 at [71].
[163] *Eli Lilly and Company Limited v Apotex Pty Ltd* [2013] FCA 214; 100 IPR 451 at [473].

to a problem, I think it is clear from Mr Hay's evidence that quaternary ammonium salts are not among the solutions to which a person would be *directly* led. To my mind there is a distinction to be made between those things that would be investigated as a matter of routine, and those that would not be excluded from a research project, which would seem to fall more appropriately under the umbrella of 'obvious to try'.

169. Nufarm has not established that the claims lack inventive step in light of the common general knowledge alone.

6.3.2 The 677 application

170. I have discussed above the reasons why the claims of the 508 application do not lack inventive step in light of the common general knowledge alone. Corresponding evidence from Mr Hay was filed in the 677 application.[164] It is not necessary to repeat the evidence or the submissions of the parties, because the same reasons as given in relation to the 508 application lead to a conclusion that Nufarm has not established that the claims of the 677 application lack inventive step in light of the common general knowledge alone.

6.4 Inventive step in light of section 7(3) documents

171. At the hearing I understood Nufarm to press inventive step in light of D2, D3 and D28 for both applications. I have set out the disclosure of each of these documents above.

172. I note that Dow submitted that there is "a strong secondary indicium of non-obviousness" given that during the long period Nufarm asserts the use of amine salts of phenoxy compounds has been known there is no clear teaching of the use of compounds defined by the present claims in addressing the problem of volatility.[165] While I am mindful of the High Court's caution that Australian courts "should be slow to ignore secondary evidence", I note that the weight of such evidence will vary.[166] In any event, I have not needed to have regard to this consideration.

6.4.1 Inventive step in light of D2

6.4.1.1 The 508 application

173. Nufarm submitted that to the extent that D2 does not disclose choline hydroxide sufficiently to anticipate the claims, it is the first form of choline a skilled person would think of using and therefore the subject matter of the present claims would be arrived at without invention. Nufarm further noted that D2 refers to the risk of chemical damage to various crops being reduced through use of reduced amounts of herbicide or enhanced selectivity, and the advantages in relation to environmental pollution associated with administrates of reduced amounts of herbicide. Nufarm submitted that a skilled person would understand that there are other consequential advantages with respect to environmental damage and that a lower dose would be associated with a lower risk of injuring a neighbouring crop.

174. Dow submitted that D2 is directed towards herbicides useful in cold climates, where volatility is not a concern,[167] and does not make any mention of reducing volatility.

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[164] Hay 2.1 at [55], Hay 2.2 at [82].
[165] Dow's submissions of 7 August 2019 at [183].
[166] *Lockwood Security Products Pty Ltd v Doric Products Pty Ltd (No 2)* [2007] HCA 21; 235 CLR 173 at [132].
[167] Wright 1 at [93].

175. In my view, a skilled person seeking a derivative of 2,4-D with reduced volatility would *prima facie* not consider D2 a reasonable starting point given its silence with respect to the volatility of the herbicides disclosed. Further, while Dr Hay indicated that the reported absence of chemical damage to maize and wheat crops "must equate to the composition of D2 having a reduced volatility",[168] there is no evidence that a person considering this document absent knowledge of the claimed solution would have considered this to be the case or considered D2 a reasonable starting point. Dr Wright understood the crop protection to be a result of enhanced selectivity for the weed,[169] and D2 itself says:

> "It is inferred that chemical damage to crops is reduced because the amount of phenoxy compounds sufficient to produce the herbicidal effect is relatively low and can be used at low concentrations, and that the growth stunting effect of the penetration of the herbicide is moderated."[170]

176. I note that with respect to his evidence relating to the prior art documents, Mr Hay indicated (emphasis added):

> "I was provided with several prior art documents. I was then asked to consider whether, in my opinion, the invention disclosed in the opposed Patent Application did not involve an inventive step as at 26 February 2007 in light of the common general knowledge at that time together with the contents of any of those prior art documents considered. In providing my response, I was asked to identify <u>which part or parts of the prior art documents I could have combined with the common general knowledge to reach the conclusion that the invention disclosed in the Specification did not involve an inventive step</u> as at 26 February 2007."[171]

Given this instruction and Mr Hay's knowledge of the invention prior to giving his evidence, it is difficult to afford his evidence in relation to inventive step great weight,[172] particularly where it is inconsistent with other experts and the face of the citation.

177. Nufarm has not established that the claims lack inventive step in light of D2.

6.4.1.2 The 677 application

178. In addition to the submissions set out above in relation to the 508 application, Dow submitted that D2 teaches the application of the 2,4-D herbicide to rice and wheat crops, which is what is to be avoided in the method of the present claims.

179. At the hearing, Nufarm emphasised that the method of the present claims is simply what a person would do, that is, as a matter of routine, when applying herbicide – apply herbicide to the weed of interest and not to crops the damage of which was undesirable. This seems a logical proposition.

180. Ultimately, though, the relevant question is what the hypothetical skilled person would do as a matter of routine faced with the problem to be solved. In this regard the conclusions in relation to

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[168] Hay 1.2 at [151].
[169] Wright 1 at [91].
[170] Annexure PMH-27 to Hay 1.1 at page 5.
[171] Hay 1.1 at [176].
[172] See also *Metso Sweden AB v Outotec Pty Ltd* [2019] APO 25 at [132]-[134].

the 508 application follow through to the 677 application. While the form of the claim is different, the problem that the claims address is the same, and there is no evidence that in seeking to address the volatility problem a skilled person would consider D2 a reasonable starting point from which to take routine steps.

181. Nufarm has not established that the claims lack inventive step in light of D2.

6.4.2 Inventive step in light of D3

6.4.2.1 The 508 application

182. Nufarm submitted that in the event that it was considered that there is not an explicit disclosure of choline hydroxide in D3, it would nevertheless be a matter of routine for a person skilled in the art to use a quaternary ammonium hydroxide, including choline hydroxide, in implementing the teaching of the document. Nufarm also noted that D3 explicitly refers to the volatility problem.

183. Dow submitted that while D3 refers to the issue of volatility, it does not assert that there is any problem with the volatility of amine derivatives of 2,4-D and therefore does not suggest that any improvement over amine derivatives will be achieved. Instead, D3 seeks to preserve the level of volatility of amine derivatives. Dow further stated:

> "D3 is not directed to reducing volatility. D3 teaches a different approach to achieve improved performance, which is to target the surface tension of the mixture. The underlying theory is explained in D3 as being that for conventional formulations, their high surface tension inhibits penetration '*through the stomata or other fissures or openings of leaf surface of undesired vegetation*'. Further, D3 teaches that having the undissolved salt mixture liquid at 20°C assists with absorption because the crystallisation that can occur with prior art herbicides will impede absorption into the plant."[173]

184. Dow also submitted that while including quaternary ammonium cations in a long list of potential cations, D3 provides no encouragement to use those cations over more conventional amines.

185. While D3 does refer to the volatility problem associated with 2,4-D esters, I agree with Dow that it does not suggest that any derivatives disclosed would have improved volatility relative to 2,4-D amines – while various examples indicate that in the conditions of D3 there was no injury to the crop, there is no indication that this is different from the commercial amine salt control. Given that it appears to have been understood that a salt fixed in ionic form would have very low volatility, it would not be surprising if a person would have made quaternary ammonium salts with an expectation of lower volatility relative to amine salts, but there is no clear evidence to support a conclusion that a person unaware of the present invention would have taken that approach.

186. Accordingly, in my view the evidence does not establish that a skilled person would be directly led to prepare quaternary ammonium salts of 2,4-D with an expectation of reduced volatility relative to known amine salts and it follows that Nufarm has not established that the claims lack inventive step in light of D3.

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[173] Dow's submissions of 7 August 2019 at [176].

6.4.2.2 The 677 application

187. In addition to the submissions set out above, Dow submitted that the exemplified application of the herbicides of D3 was *to* the crop rather than to neighbouring or adjacent weeds. Nufarm reiterated its submissions made in relation to D2.

188. As with D2, the evidence does not support a conclusion that in seeking derivatives of herbicidal carboxylic acids with decreased volatility relative to commercial amine salts a skilled person would consider D3 a reasonable starting point from which to take routine steps. Accordingly, Nufarm has not established that the claims lack inventive step in light of D3.

6.4.3 Inventive step in light of D28/D25

6.4.3.1 The 508 application

189. Nufarm submitted that example III of D28 (which describes the reaction of tetramethyl-ammonium chloride with the sodium salt of 2,4-D) together with the common general knowledge would lead a skilled person to the subject matter of the present claims, there being no suggestion that the method of claim 1 is sufficient to confer inventiveness.

190. Dow submitted that D28 is related to benzonitriles and refers to 2,4-D only because herbicidal mixtures are common. Dow noted that there is no teaching relating to volatility of 2,4-D derivatives, with D28 being directed towards water soluble derivatives of benzonitriles.

191. In my view, a skilled person seeking a derivative of 2,4-D with reduced volatility would *prima facie* not consider D28 a reasonable starting point given its focus on benzonitrile derivatives and silence regarding the volatility of 2,4-D derivatives, and there is no evidence that a person considering this document without knowledge of the claimed solution would have done so.

192. Nufarm has not established that the claims lack inventive step in light of D28.

6.4.3.2 The 677 application

193. The same conclusions in relation to the 508 application necessarily follow for the 677 application. Although D25 does disclose a quaternary ammonium salt of 2,4-D and its use in a method of claim 1 and therefore deprives certain claims of novelty as set out above, for inventive step the question becomes one of what a person skilled in the art would do as a matter of routine *faced with the same problem* – here seeking a herbicidal carboxylic acid with reduced volatility. For the same reasons as given in relation to the 508 application, Nufarm has not established that the claims lack inventive step in light of D25.

6.5 Conclusion on inventive step

194. The ground of inventive step is not made out in relation to either application.

7. Utility

195. Paragraph 18(1)(c) of the *Act* requires that the claimed invention be useful. The Full Court summarised the principles of utility in *Artcraft Urban Group Pty Ltd v Streetworx Pty Ltd*:

> "The 'basic principle' of inutility is that if an invention 'does what it is intended by the patentee to do, and the end attained is itself useful, the invention is a useful invention'. What the invention is 'intended' to do is a matter to be gathered from 'title and the whole of the specification'.
>
> Put another way, the two questions are: first, what is the promise of the invention derived from the whole of the specification?; second, by following the teaching of the specification, does the invention, as claimed in the patent, attain the result promised for it by the patentee? Further, 'everything' that is within the scope of a claim must be useful, that is, attain the result promised for the invention by the patentee." [174]

196. In *ESCO Corporation v Ronneby Road Pty Ltd* the Full Court made clear that it is necessary to properly construe the specification to determine the promise of the invention.[175] I note that section 7A of the *Act* provides that for an invention to be considered useful the specification must disclose a specific, substantial and credible use for the invention, but this requirement is additional to the requirement that the claimed invention must achieve the promised benefit[176] and Nufarm's oppositions relate only to a failure to achieve the promised benefit.

7.1 The 508 application

197. Nufarm submitted that the promise of the invention is a herbicidal carboxylic acid derivative that is at least as active as the commercially used salts, but is less volatile. In Nufarm's submission the data provided in the specification establishes that the promise is not achieved. For example, Table II (reproduced earlier) demonstrates that compound 1e, the choline salt of 2,4-D has 68% efficacy on broadleaf dock relative to 77% efficacy of the corresponding dimethylamine salt. I note that compound 1e had the same level of efficacy as the dimethylamine salt against kochia.

198. At the hearing I questioned whether there was a difference between what a specification sets out as an aspirational goal and what it promises to actually achieve, noting the difference in language between two passages in the specification (with emphasis added):

> "… it **would be desirable** to have an herbicidal carboxylic acid derivative that is **at least as active** as the commercially used carboxylic acid herbicide salts…"[177]

and

> "It has **now been found** that compounds formed by combining a carboxylic acid herbicide with either a tetraalkylammonium or an (arylalkyl)trialkylammonium hydroxide have herbicidal activity on an acid equivalent basis **at least comparable** to the commercially used carboxylic acid herbicide salts…"[178]

199. I understood Nufarm's submission to be that there is no material difference between these passages and that "comparable" is the same as "at least as active", although I note that Mr Hay

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[174] [2016] FCAFC 29; 110 IPR 82 at [120]-[121] (citations omitted).
[175] [2018] FCAFC 46; 131 IPR 1 at [291], [292], [300].
[176] Explanatory Memorandum, Intellectual Property Laws Amendment (Raising the Bar) Bill 2011 (Cth) at page 44.
[177] 508 specification, page 2, lines 1-3.
[178] 508 specification, page 2, lines 5-9.

seemed to accept that "comparable to" was a lesser standard than "at least as active as".[179]

200. Dow, however, submitted that there is a difference between what is desirable and what is delivered or achieved, and that "at least comparable" simply requires broad similarity. In this regard, Dow noted that no error margins are reported in the specification and that the data reported is based upon a visual assessment by a human. Mr Ouse indicated that "[i]n the context of biological systems error margins of about +/- 10% are typical."[180] In response, Mr Hay stated:

> "A 10% variation between individual plants is often observed and for this reason it is universal practice to apply the same herbicide treatment to a number of plants and to calculate the mean (average) response to the treatment. I disagree that a person skilled in the art would consider a 10% difference in the means of different treatments to be 'comparable'."[181]

201. Dow submitted that the absence of error margins in the data in the specification prevents the drawing of a firm conclusion that the exemplified salts are less active than the dimethylamine salt. Dow further submitted that the "at least comparable" activity is to be considered in the context of the broad spectrum of herbicidal activity exhibited by the defined compounds, that is, by reference to a range of weeds of commercial relevance and not to isolated examples.

202. I find Dow's submissions persuasive. The Macquarie Dictionary[182] defines comparable as "capable of being compared" or "worthy of comparison". Given this, and the use of different language (i.e. "at least comparable" versus "at least as active"), I think it is a fair reading of the specification that what is promised is not compounds which are "at least as active" as commercially used salts, but rather compounds with broadly similar activity to commercially used salts such that they are worthy of comparison. I also accept that the consideration of comparable activity should be made with a view to the context that these are broad spectrum herbicides. Taking these matters into account, I am not satisfied that the data in Table II demonstrates a failure of compounds falling within the scope of the claims to achieve the promise of the invention.

203. Nufarm has not established that the claims do not achieve the promise of the invention.

7.2 The 677 application

204. Nufarm repeated the submission regarding the failure to achieve the promised benefit with respect to the composition being at least as active as commercially used carboxylic acid herbicide salts. For the reasons give above in relation to the 508 application this point does not succeed.

205. Nufarm further submitted that prevention of injury to a neighbouring crop to which the herbicidal composition has not been administered is a further promise of the invention which is not achieved by embodiments falling within the scope of the claims. For this submission to succeed, prevention must be understood as total avoidance of injury, rather than attenuation or reduction of the level of injury. At the hearing I posed the question of whether, accepting the construction advanced by Nufarm, the fact that the claim is directed to a method of preventing injury means

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[179] Hay 1.2 at [71].
[180] Ouse 1 at [31].
[181] Hay 1.2 at [70].
[182] *Macquarie Dictionary Online*, 2019, Macquarie Dictionary Publishers, an imprint of Pan Macmillan Australia Pty Ltd, www.macquariedictionary.com.au.

that embodiments that do not have that result are excluded from the claim. I understood Nufarm to accept that if preventing was understood in absolute terms that the claim would be self-limiting, in that it would exclude by its own terms inutile compounds/methods.

206. In any event, I have construed the claims above and decided that in the context of the present claims and specification prevention does not require absolute avoidance of any injury to the non-target crop, but rather that injury is hindered or reduced relative to commercially used herbicidal carboxylic acid salts. There is no evidence to suggest that administration of the herbicidal compositions defined in claim 1 does not achieve this result. It follows that Nufarm has not established that the claims do not achieve the promise of the invention.

8. Support

207. Subsection 40(3) as amended by the *Raising the Bar Act* requires that the claims must be supported by matter disclosed in the specification. The requirement of support can be summarised as requiring that the scope of the claims "should correspond to the technical contribution to the art".[183] This has been more fully explained as follows:

> "the definitions in the claims should essentially correspond to the scope of the invention as disclosed in the description. In other words, as was stated in decision T 26/81, the claims should not extend to subject-matter which, after reading the description, would still not be at the disposal of the person skilled in the art. Consequently, a technical feature which is described and highlighted in the description as being an essential feature of the invention, must also be a part of the independent claim or claims defining this invention."[184]

208. A useful approach to determining whether the requirements of support are satisfied was set out in *CSR Building Products Limited v United States Gypsum Company*:[185]

> i. construe the claims to determine the scope of the invention as claimed,
> ii. construe the description to determine the technical contribution to the art, and
> iii. decide whether the claims are supported by the technical contribution to the art.

8.1 The 508 application

209. At the hearing, I understood Nufarm's submission in relation to support to be that that the claims of the 508 application lack support because there is no connection between the problem asserted in the specification (the production of herbicides with reduced volatility) and the production process by which the claims are limited. That is, that process provides no contribution to, and is unrelated to, the solution to the problem. Accordingly, there is an inconsistency between the teaching of the specification and the limitation in the claims.

210. Dow responded that it is clear that the product of the defined process will address the problem to which the specification is directed, and there is a technical element to the claim: "the hydroxide

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[183] *Fuel Oils/EXXON* (T409/91) [1994] OJ EPO 653 at 659.
[184] Ibid at 659-660 (citations omitted).
[185] [2015] APO 72 at [115]. This approach has subsequently been adopted by numerous delegates of the Commissioner, see, e.g. *BASF Corporation* [2019] APO 34, *BASF SE v The Lubrizol Corporation* [2019] APO 8, *Fisher & Paykel Healthcare Limited v ResMed Limited* [2018] APO 67, *Rimfrost AS v Aker BioMarine Antarctic AS* [2018] APO 34.

salt of a tetraalkyl ammonium cation will form a strong base, and is thereby able to abstract essentially all of the free hydrogen associated with 2,4-D acid"[186] which reduces the proportion of 2,4-D present as free acid relative to the use of other salts.[187] Dow also submitted that an applicant is entitled to frame claims that are narrower than the totality of what has been invented, and that the circumstance that more broadly drafted claims may be supported does not mean that narrower claims are not.

211. A lack of support will perhaps most commonly arise where there is a lack of enabling disclosure across the scope of the claims, but it may also manifest when there is a serious inconsistency between what is claimed and what is described.[188] For example, where the claims omit a feature that is clearly essential to how the described invention works and achieves its stated benefits, there will be a lack of support even if the claim is enabled – in such cases the claims will be broader than is justified by the contribution to the art.

212. However, I agree with Dow that the converse is not necessarily true – it is not apparent to me that the established principles support an inevitable conclusion that inclusion of a limiting feature described in the specification, but inessential to the working of the described invention, gives rise to a lack of support. This is not necessarily a serious inconsistency and in the present case I consider that the contribution to the art encompasses the claimed product produced by any of the disclosed methods, including reaction of the 2,4-D acid with a tetraalkylammonium hydroxide. It follows that Nufarm has not made out this ground of opposition.

8.2 The 677 application

213. To the extent that Nufarm repeats the submissions in relation to the 508 application, for the reasons give above they do not succeed. I further understand Nufarm to submit that the claims do not align with the specification to the extent that they require absolute prevention of injury to neighbouring crops but what is disclosed is reduction, rather than total avoidance, of injury.

214. I have discussed previously the disclosure of the specification and the construction of the claims in this regard. I do not understand the claims to require absolute avoidance of any injury and it is not apparent to me that the claims exceed the contribution to the art or are seriously inconsistent with the disclosure. Nufarm has not made out this ground of opposition.

9. Conclusion

215. The opposition to the 508 application is not successful.

216. Claims 1-3, 6, 8 and 12 of the 677 application are not novel. I will allow Dow an opportunity to propose amendments to overcome this finding.

10. Costs

217. While it is usual in matters before the Commissioner that costs are awarded following the event according to Schedule 8, Nufarm submitted that a departure from the Schedule would be appropriate, seeking costs on an indemnity basis, or that Dow pay 50% of its costs. In this regard, Nufarm referred to Dow's withdrawal of the opposed great-grandparent application 2008219567

[186] Dow's submissions of 7 August 2019 at [31].
[187] Wright 1 at [95].
[188] *Univeral Polymers Pty Ltd v Greenzone Pest Innovations Pty Ltd* [2019] APO 23 at [62].

following (a) completion of the evidentiary stages of the standard opposition, (b) Nufarm's request to be heard in relation to a section 104 opposition and (c) the filing of the 508 application, as well as Dow filing a further divisional application with similar claims to the 508 application, as conduct warranting a departure from the Schedule.[189] Nufarm also submitted that the filing of the present two applications required that costs of two separate oppositions be incurred.[190]

218. Dow submitted that "an award of costs is to address the outcome and circumstances of the particular proceeding in which the award of costs is being considered" and that the conduct of parties in a separate proceeding was an issue for costs of that other proceeding.[191] In this regard, Dow noted that the conduct referred to by Nufarm was conduct in a separate proceeding in relation to which Nufarm had sought and was awarded costs.[192] Accordingly, Dow submitted that a variation from the Schedule would not be appropriate.

219. Withdrawal of an opposed application following the filing of a divisional application directed to the same or similar subject matter is generally not in the public interest, as it allows an applicant to "avoid the scrutiny of opposition proceedings whilst continuing to pursue the opposed invention", and can also put an opponent to unnecessary expense with respect to preparing for an opposition that does not proceed, and subsequently monitoring and possibly opposing the divisional application.[193] This has previously been found to constitute conduct warranting a variation from the Schedule with respect to the award of costs relating to the proceeding concerning the withdrawn application.[194] However, I note that in *Super Internet Site System Pty Ltd v Sensis Pty Ltd* the Deputy Commissioner suggested that to the extent that costs incurred in relation to the withdrawn application were duplicated in future opposition proceedings "it would appear open to the Commissioner at that time to consider all the relevant circumstances leading up to those proceedings and to make an appropriate award of costs".[195] In support of this he referred to *Evans v Maclean Shire Council*[196] and *Oshlack v Richmond River Council*[197] which confirm that the whole circumstances of a case and conduct both in and leading up to proceedings may be considered in relation to the question of costs. Accordingly, I am not convinced that the present proceedings must be considered in complete isolation from the withdrawn application – in my view this forms part of the context within which the present matter has arisen.

220. The claims of the 508 application are substantially the same as the proposed claims of the great-grandparent application at the time it was withdrawn. While Dow has been successful in the opposition to the 508 application, having regard to all the circumstances leading up to these proceedings I will make no award of costs in this matter.

221. The considerations in relation to the 677 application are less compelling and I am not persuaded that any variation in costs is appropriate in relation to this application. Nufarm has been successful and I will therefore award costs against Dow according to Schedule 8.

Dr S. J. Smith
Delegate of the Commissioner of Patents

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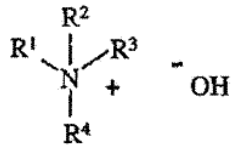
[189] Nufarm's 508 submissions at [194]-[199].
[190] Nufarm's submissions of 23 August 2019 at [8].
[191] Dow's submissions of 23 August 2019 at [13].
[192] Dow's submissions of 23 August 2019 at [17]-[18].
[193] Explanatory Memorandum, Intellectual Property Laws Amendment (Raising the Bar) Bill 2011 (Cth) at page 77.
[194] *Super Internet Site System Pty Ltd v Sensis Pty Ltd* [2006] APO 27.
[195] [2006] APO 27 at [24].
[196] [2004] NSWLEC 89.
[197] [1998] HCA 11, 193 CLR 72.

Annex A: Claims of the 508 application

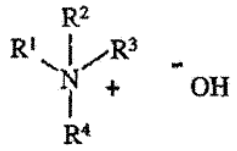
1. An herbicidal compound comprising the reaction product produced by the process of:
   - combining 2,4-dichlorophenoxyacetic acid and a (tetraalkyl) ammonium hydroxide; in which the (tetraalkyl)ammonium hydroxide is a compound of the formula



wherein when R^1, R^2 and R^3 are methyl, R^4 is not methyl: and
   - isolating the reaction product, thereby producing the herbicidal compound.

2. An herbicidal compound according to claim 1; wherein R^1, R^2 and R^3 independently represents (C_1-C_{16}) alkyl or any two of R^1, R^2 and R^3 represent -$(CH_2)_n$- where n is an integer from 3-5 and R^4 represents (C_1-C_{16}) alkyl or arylalkyl).

3. An herbicidal compound comprising the reaction product produced by the process of:
   - combining 2,4-dichlorophenoxyacetic acid and a (tetraalkyl) ammonium hydroxide; in which the (tetraalkyl)ammonium hydroxide is a compound of the formula



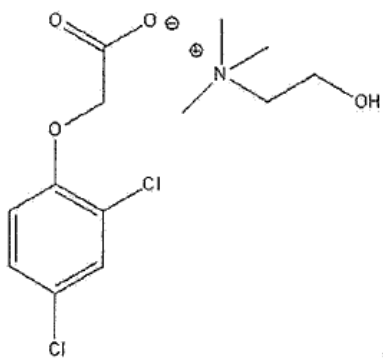
wherein R^1, R^2 and R^3 independently represents (C_1-C_{16}) alkyl or any two of R^1, R^2 and R^3 represent -$(CH_2)_n$- where n is an integer from 3-5 and R^4 represents ((C_2-C_{16}) alkyl or arylalkyl); and
   - isolating the reaction product, thereby producing the herbicidal compound.

4. An herbicidal compound according to any one of claims 1 to 3 in which R^1, R^2 and R^3 are CH_3 and R^4 is (C_2-C_{16}) alkyl or arylalkyl.

5. An herbicidal compound according to claim 4 in which R^4 is benzyl or hexadecyl.

6. An herbicidal compound according to any one of claims 1 to 3 in which R^1, R^2, R^3 and R^4 are all ethyl, propyl or, butyl.

7. An herbicidal compound comprising the reaction product produced by the process of:
   - combining 2,4-dichlorophenoxyacetic acid and choline hydroxide, said herbicidal compound having the formula:



; and

- isolating the reaction product, thereby producing the herbicidal compound.

8. An herbicidal composition comprising an herbicidally effective amount of a compound, when produced according to the process of any one of claims 1 to 7, or mixtures thereof, in admixture with an agriculturally acceptable adjuvant or carrier.

9. An herbicidal composition according to claim 8 further comprising one or more other herbicides.

10. An herbicidal composition according to claim 8 or 9 wherein the concentration of active ingredients in the composition is from 0.001 to 98 percent by weight.

11. An herbicidal composition according to claim 8 or 9 wherein the concentration of active ingredients in the composition is from 0.1 to 90 percent by weight.

12. A method of controlling undesirable vegetation which comprises contacting the vegetation or the locus thereof with, or applying to the soil to prevent the emergence of vegetation, an herbicidally effective amount of a compound when produced according to the process of any one of claims 1 to 7.

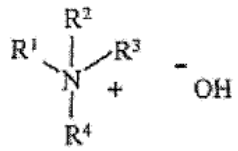
13. A method of controlling undesirable vegetation which comprises contacting the vegetation or the locus thereof with, or applying to the soil to prevent the emergence of vegetation, an herbicidally effective amount of a composition according to any one of claims 8 to 11.

14. A method of controlling undesirable vegetation in a crop that has been made tolerant or resistant to 2,4-dichlorophenoxyacetic acid, which comprises contacting the vegetation or the locus thereof with, or applying to the soil to prevent the emergence of vegetation, an herbicidally effective amount of a compound when produced according to the process of any one of claims 1 to 7.

15. A method of controlling undesirable vegetation in a crop that has been made tolerant or resistant to 2,4-dichlorophenoxyacetic acid, which comprises contacting the vegetation or the locus thereof with, or applying to the soil to prevent the emergence of vegetation, an herbicidally effective amount of a composition according to any one of claims 8 to 11.

Annex B: Claims of the 677 application

1. A method for preventing a herbicidal composition that has been administered to a locus of unwanted vegetation from injuring a crop that neighbors the locus and to which the herbicidal composition has not been administered, the method comprising administering to the locus of unwanted vegetation but not to the crop, a herbicidal composition comprising the reaction product of a herbicidal carboxylic acid and a (tetraalkyl) ammonium hydroxide; in which the (tetraalkyl)ammonium hydroxide is a compound of the formula:



wherein R^1, R^2 and R^3 independently represents alkyl or any two of R^1, R^2 and R^3 represent -$(CH_2)_n$- where n is an integer from 3-5 and R^4 represents ((C_1-C_{16}) alkyl or arylalkyl), thereby preventing the herbicidal composition from injuring the crop.

2. The method of claim 1, wherein the herbicidal carboxylic acid is 2,4-D.

3. The method of claims 1 or 2, in which R^1, R^2, R^3 and R^4 are the same.

4. The method of claims 1 or 2, in which R^1, R^2 and R^3 are CH_3 and R^4 is (C_2-C_{16}) alkyl or arylalkyl.

5. The method of claim 4, in which R^4 is benzyl or hexadecyl.

6. The method of claim 3, in which R^1, R^2, R^3 and R^4 are all methyl, ethyl, propyl or, butyl.

7. The method of claim 4, in which the (tetraalkyl) ammonium hydroxide is choline hydroxide.

8. The method of any one of claims 1-7, wherein the non-target plant or crop is selected from the group consisting of tomatoes, cotton, soybeans, sunflowers, grapes, and combinations thereof.

9. The method of any one of claims 1-7, wherein the non-target plant or crop is selected from the group consisting of corn, wheat, rice, soybean, sugarbeet, cotton, and canola.

10. The method of claim 9, wherein the non-target plant or crop is wheat.

11. The method of claim 9 or 10, wherein the non-target plant or crop is tolerant or resistant to 2,4-D.

12. The method of any one of the preceding claims, wherein the unwanted vegetation is selected from the group consisting of broadleaf weeds.