Commissioner=s Decision #1310
Décision de la Commissaire #1310

TOPIC: B00, B20, B22, G00
SUJET: B00, B20, B22, G00

Application No.	:	551,406
Demande no.	:	551,406

COMMISSIONER=S DECISION SUMMARY

C.D. 1310, Application No. 551,406

The subject application was rejected by the Examiner under section 2 of the *Patent Act* for containing claims for which the utility could not be soundly predicted and under subsection 34(2) of the *Patent Act* for containing claims directed to a desired result.

The Commissioner of Patents agreed with the recommendations of the Board that the application be allowed provided a specified amendment is made and pending review of potential conflicts under section 43 of the *Patent Act*. References herein to the *Patent Act* are as it read immediately before October 1, 1989.

INTRODUCTION

1. This Decision deals with a review by the Commissioner of Patents of the Examiner=s Final Action dated November 27, 2007, on application 551,406, filed on November 9, 1987 and entitled SUPERCONDUCTIVITY IN SQUARE-PLANAR COMPOUND SYSTEMS. The inventor is Ching-Wu Chu and the current owner is the UNIVERSITY OF HOUSTON.

OVERVIEW OF THE TECHNOLOGY

2. The invention relates to superconducting metal oxide compositions that can be represented by the formula $[L_{1-x}M_x]_aA_bO_y$, wherein >L= is a rare earth element (a lanthanide or yttrium) or a combination thereof; >M= is barium and/or strontium; and >A= is copper.

3. The field of superconductors is complex and specialised. Generally speaking, a superconductor is a material for which a critical temperature (T_c) exists at which it becomes superconductive, exhibiting zero electrical resistance and expelling its interior magnetic field (the Meissner effect). In this Decision, the definition of >superconductor= that will be used is as taken from page 1 of the present disclosure: Acompositions offering no electrical resistance at a temperature below a critical temperature.@ For our purposes then,>superconductor= refers to the absence of electrical resistance in the materials when cooled below a given temperature (T_c).

4. A further note needs to be made of the composition of these materials. Although represented by a formula that may suggest a single, pure compound, this is not necessarily the case. The materials may consist of multiple >phases=, which are regions within a material that are uniform in chemical composition and physical state, but which differ physically and/or chemically from other regions. Some of these phases may not contribute to the superconductivity of the composition, but may in fact be insulating. The materials may nonetheless superconduct provided there is sufficient superconductive phase to impart this quality on the material as a whole.

PROSECUTION HISTORY

5. The present application was filed on November 9, 1987 under the provisions of the *Patent Act* as it read immediately before October 1, 1989 (henceforth: the *Patent Act*). A total of nine Office Actions were issued, commencing with December 17, 1990, and culminating in the Final Action dated November 27, 2007.

6. In the Office Action of December 30, 2004, the Examiner indicated that claims on file did not comply with section 2 of the *Patent Act*. This was subsequently re-asserted three times prior to the Final Action. An additional defect was identified in the Final Action under subsection 34(2) of

the *Patent Act*. These are what will be considered in this Decision, since the response to the Final Action (dated May 27, 2008) was deemed by the Examiner to be insufficient to correct the defects. The amendment submitted with the Final Action response resulted in the 19 claims on file being replaced with another set of 19 claims, with only claim 5 being amended to overcome a separate issue. The remainder of the claims were not amended. Following the Final Action, the case was forwarded to the Board along with a Summary of Reasons. A copy of this Summary of Reasons was also forwarded to the Applicant, but no further comments/submissions have been received, and the Applicant declined the Board=s invitation for a hearing.

OVERVIEW OF THE GROUNDS FOR REJECTION

7. Broadly put, the Final Action states:

8. Utility cannot be soundly predicted across the entire scope of claims 1B4 and 11B15, contrary to section 2 of the *Patent Act*; and

9. Claims 1B10 are defined in terms of the desired result to be achieved, contrary to subsection 34(2) of the *Patent Act*.

[1] As noted in the Summary of Reasons, claims 16B19 are considered allowable.

CLAIMS AT ISSUE

[2] For convenience, the four independent claims are reproduced below. Claim 1 reads:

> 1. A composition which is superconductive at a temperature of 70EK and higher up to 98EK, comprising:
> a metal oxide of the formula
> $[L_{1-x}M_x]_aA_bO_y$
> wherein;
> AL@ is yttrium, lanthanum, neodymium, samarium, europium, gadolinium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, or mixtures thereof; AM@ is barium, strontium, or mixtures thereof; AA@ is copper; Ax@ is from about 0.65 to 0.80; Aa@ is 1; Ab@ is 1; and Ay@ is a value from about 2 to about 4 that provides the metal oxide with zero electrical resistance at a temperature of 70EK or above.

Because of the limitations on the variables put in the claim (i.e. a = b = 1), the formula can be simplified slightly to $[L_{1-x}M_x]CuO_y$. Based on the values for >x=, the proportion of >M= in the brackets is from 0.65B0.80, so >L= is therefore from 0.35B0.20, and y = 2B4 (for simplicity, >about= is being ignored in the ranges). The temperature at which the composition becomes superconductive (i.e. the transition temperature, T_c) is in the range of 70B98 K.

[3] Claim 5 differs somewhat, both in scope and in the form the formula takes:

> 5. The composition which is superconductive at a temperature of 70EK and higher up to 98EK, comprising a metal oxide of the formula
> $LM_2A_3O_{6+\delta}$
> and wherein AL@ is yttrium, lanthanum, neodymium, samarium, europium, gadolinium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, or mixtures thereof; AM@ is barium, strontium, or mixtures thereof; AA@ is copper; and δ is a number value from about 0.1 to about 1.0 that provides the oxide complex with zero electrical resistance at a temperature of 70EK or above.

[4] Here, the formula can again be simplified slightly, this time by replacing >A= with >Cu= to give $LM_2Cu_3O_{6+\delta}$. Although the format differs from claim 1, it can be rearranged and recast in the $[L_{1-x}M_x]_aA_bO_y$ format of claim 1. To do so, the subscripts of >L= and >M= are totalled to give 3 and, letting the values for >L= and >M= reflect their proportions of this total, the formula can be rewritten as $[L_{0.33}M_{0.667}]_3Cu_3O_{6+\delta}$, since two-thirds of the atoms are >M=, while the remaining third are >L=. Dividing by 3 to get a = b = 1 to keep consistent with claim 1, the number of oxygen atoms ends up being (6+δ)/3. Replacing (6+δ)/3 with >y= makes the formula even more closely resemble that in claim 1: $[L_{0.33}M_{0.667}]CuO_y$, with y . 2B2.3.

[5] Claim 8 is similar to claim 5:

> 8. A material containing a sufficient quantity of a superconductive crystalline phase to cause the material to exhibit substantially zero electrical resistance at a temperature of 77EK and higher up to 98EK; said crystalline phase composition having the formula $LM_2Cu_3O_{6+\delta}$, wherein AL@ is Y, La, Nd, Sm, Eu, Gd, Dy, Ho, Er, Tm, Yb, Lu, or mixtures thereof; AM@ is Ba, Sr or mixtures thereof; and δ is a value from about 0.1 to about 1.0 that provides the composition with zero electrical resistance at a temperature of 77EK.

As with claim 5, claim 8 can be recast in the $[L_{1-x}M_x]_aCu_bO_y$ format for direct comparison to claim 1. Summing >L= and >M=, dividing by 3, and replacement of (6+δ)/3 with >y= (as was done for claim 5) gives the same formula: $[L_{0.33}M_{0.667}]CuO_y$ with y . 2B2.3. The difference between this claim and claim 5 is that claim 8 is directed toward a material comprising a sufficient quantity of the phase represented by this formula to achieve superconductivity, and that the transition temperature is from 77 K to 98 K, rather than slightly broader range 70 K to 98 K. Both claim 5 and claim 8 were only found by the Examiner to not comply with subsection 34(2) of the *Patent Act*, not section 2. Lack of sound prediction was not raised in relation to these claims despite the fact that the formulae in these claims represent particular embodiments of the materials in claim 1 (the formula is also the same as in dependent claim 3). This appears to have been because it was not apparent during examination that a reformulation could be done to get them to the $[L_{1-x}M_x]_aCu_bO_y$ format for direct comparison to these other claims. As it turns out, their omission did not change our conclusions.

[6] Finally, independent claim 11 is a method claim:

> 11. A method for making a superconducting metal oxide, comprising the steps of:
> mixing solid compounds containing L, M, A and O in amounts appropriate to yield the formula $[L_{1-x}M_x]_aA_bO_y$ wherein AL@ is yttrium, neodymium, samarium, europium, gadolinium, dysprosium, holmium, erbium, thulium, ytterbium, lutetium, or a combination thereof; AM@ is barium, strontium, or

mixtures thereof; AA@ is copper, Aa@ is 1 to 2; Ab@ is 1; Ax@ is about 0.01 to 1.0; and Ay@ is a value from about 2 to about 4 that provides the metal oxide with zero electrical resistance at a temperature of 40EK or above up to 54EK;
compacting the mixture into a solid mass by application of pressure from about 100 to about 3,000 psi;
heating the solid mass in air to a temperature of from about 800 to about 1000EC for a time sufficient to react the compacted mixture in the solid state; and
quenching the solid mass to ambient temperature in air.

[7] The method is for making compositions, that can be written as $[L_{1-x}M_x]_aCuO_y$. The differences between these compositions and those of the composition claims are that the proportion of >L= in the compositions made by the methods of claim 11 is from 0B0.99 while >M= is from 0.01B1; a = 1B2; >L= does not include lanthanum; and the T_c is reduced somewhat to 40 K to 54 K. This method therefore is not restricted to making the compositions defined in the other claims.

[8] For ease of reference, the independent claims are summarised in Table 1, taking into account the formula >simplifications= mentioned (see paras. 9B12). The values given for >M= and >L= reflect their proportions, and correspond to the values >x= and >1-x=, respectively.

Table 1: Summary of the independent claims.

Independent Claim	$[L_{1-x}M_x]_aCuO_y$ Values	T_c	Basis for the Defect
1	L = 0.35B0.20 M = 0.65B0.80 a = 1 y = 2B4	70B98 K	section 2; and subsection 34(2)
5	L = 0.33 M = 0.667 a = 1 y . 2B2.3	70B98 K	subsection 34(2)
8	L = 0.33 M = 0.667 a = 1 y . 2B2.3	77B98 K	subsection 34(2)
11	L = 0B0.99 M = 0.01B1 a = 1B2 y = 2B4	40B54 K	section 2; and subsection 34(2)

1. SOUND PREDICTION

[9] The first question to be addressed is whether or not the subject-matter of claims 1B4 and 11B15 could have been soundly predicted to have the stated utilityC*viz*. achieve zero electrical resistance at the given temperaturesCto comply with section 2 of the *Patent Act*.

THE EXAMINER=S POSITION

[10] The language the Examiner used in finding there to be a lack of sound prediction is reproduced from the Final Action, in part, below:

> Claims 1 to 4 and 11 to 15 do not comply with Section 2 of the *PATENT ACT* in effect just before 1 October 1989. The description fails to demonstrate the alleged utility of all the claimed subject matter in that there is no factual basis presented supporting the utility nor is there a sound line of reasoning as to why all the claimed materials should have the predicted utility. (Apotex Inc. V. Wellcome Foundation (2002) 2 S.C.R. 77 or 21 C.P.R. (4^{th}) 499).

[11] The Examiner then sets forth the factual basis found in the disclosure, showing the compounds evaluated, as summarised below:

$[La_{1-x}Sr_x]_aCu_bO_y$ (where x = 0.1; a = 2; b = 1 and y = 2B4);

$[La_{1-x}Ba_x]_aCu_bO_y$ (where x = 0.01B0.67; a = 1 or 2; b = 1 and y = 2B4);

$[Y_{1-x}Ba_x]_aCu_bO_y$ (where x = 0.40; a = 2; b = 1 and y < 4);

$YBa_2Cu_3O_{6+\delta}$

$LaBa_2Cu_3O_{6+\delta}$

$NdBa_2Cu_3O_{6+\delta}$

$SmBa_2Cu_3O_{6+\delta}$

$EuBa_2Cu_3O_{6+\delta}$

$GdBa_2Cu_3O_{6+\delta}$

$ErBa_2Cu_3O_{6+\delta}$

$LuBa_2Cu_3O_{6+\delta}$

[12] The Examiner concludes by highlighting what are perceived to be the gaps in the factual basis provided:

> The description . . . fails to provide a factual basis for showing the utility of
> (1) values of Ax@ greater than 0.67
> (2) mixtures of Lanthanides
> (3) oxides of Dy, Ho, Tm, and Yb

[13] The Examiner goes on to assess the sound line of reasoning by referring to various statements throughout the disclosure that could be relied upon to help predict the utility of the other species claimed. This part is reproduced in its entirety below:

> **Sound Line of Reasoning**
>
> There is no sound line of reasoning that would lead to the prediction of what elements will be useful in this composition.
>
> The first passage in the Application that might be construed as giving a sound line of reasoning is found on pages 5 and 8. There, following the discovery that very high pressure promotes superconductivity and the postulation that the pressure reduced interatomic distances, the notion of the partial substitution of a smaller atom for the known one is advanced as possibly doing the same thing. The example given is an alkaline earth metal of smaller radius than Barium. Doing the same thing for the Lanthanide is not mentioned.
>
> Later on page 5, there is a description of the crystal structure to which is attributed the reason for

superconductivity. This described structure is a modified perovskite with some specific lanthanides, but not all of them.

Page 8 repeats the notion of the partial substitution of a smaller alkaline earth atom for the known one in order to reduce interatomic distances.

Page 12 describes the substitution of Lanthanum by the smaller Yttrium atom. It also advances a different mechanism to explain the increase in critical temperature on applying high pressure. This other mechanism is that the high pressure suppresses instabilities detrimental to superconductivity.

Page 13 postulates several other reasons for superconductivity in these compositions:

- Alteration of the trivalent and divalent copper ratio, which presumably raises the critical temperature
- Interfacial effects arising from mixed phases
- Concentration fluctuations within the K_2NiF_4 phase (the diagnostic perovskite phase)
- Interactions due to mixed valence states
- An unidentified phase

There is also the statement that a mechanism which adequately explains the pressure effect has not been found.

Also on page 13, the Applicant repeats that the partial substitution of smaller alkaline earth atoms will produce the desired effect. He then mentions that the complete or partial substitution of the smaller Lutetium or Yttrium atoms for the Lanthanum ones will produce the same effect. Later on page 15, he states that he tried La, Nd, Sa, Eu, Gd, Er, and Lu with good results.

On page 16, the Applicant states that the observations (which span the Lanthanides) of superconductivity in $LBa_2Cu_3O_{6+\delta}$ demonstrate that superconductivity in this class of compounds is not sensitive to "L".

The review of the Description showed that on page 16 there is a reasonable prediction of superconductivity from factual evidence for compositions of the formula $LBa_2Cu_3O_{6+\delta}$ where L is a Lanthanide and $0.1 < \delta < 1.0$.

However the review showed that there is no reasonable prediction of superconductivity based on factual evidence for compositions of the formula $[L_{1-x}M_x]_aCu_bO_y$ where x is 0.01 to 0.67, a is 1, b is 1, and y is 2 to 4 . Page 5 teaches the partial substitution of the alkaline earth but not the Lanthanide. The description of the perovskites is not specific. Page 8 repeats the partial substitution of the alkaline earth but does not mention the Lanthanide. Page 12 describes the partial substitution of Lanthanum by the smaller Yttrium atom. Page 13 advances a number of mechanisms to explain and so predict the usefulness of other elements. None of these mechanisms give direction for predicting which elements will work and which will not. In fact, the Applicant is virtually saying that he cannot predict utility. This page also teaches the partial substitution of smaller alkaline earth and Lanthanide atoms. The list of suitable Lanthanides includes Europium, but Europium is bigger than Lanthanum both in Atomic Radius and Atomic Volume. He also omits Ce, Pr, Pm, and Tb, all of which are smaller than Lanthanum. So it would seem that substituting a smaller atom for the Lanthanide is not a sound predictor of utility. In short, there is no sound line of reasoning that would lead to the prediction of what elements will be useful in this composition.

[14] The Examiner concludes with the following:

Conclusion

There is a sound prediction that the undescribed Lanthanides (Dy, Ho, Tm and Yb) will make superconductors and subsequent experimental evidence verifying this prediction for the formula $LaBa_2Cu_3O_{6+\delta}$ where $0.1 < \delta < 1.0$.

There is no sound prediction for compositions of the formula $[L_{1-x}M_x]_aCu_bO_y$ where x is 0.01 to 0.67, a is 1, b is 1, and y is 2 to 4. Consequently, compositions of this latter formula do not comply with the Patent Act in effect just before 1 October 1989.

[15] The Examiner therefore states that there is no factual basis for the lanthanide being Dy, Ho,

Tm or Yb for compositions of the form $[L_{1-x}M_x]_aCu_bO_y$, but then concludes that there *is* a sound prediction for these lanthanides for compositions of the form $LaBa_2Cu_3O_{6+\delta}$. It seems in this latter formula that >La= was used to denote >lanthanide=, rather than >lanthanum=, since the factual basis the Examiner noted (see para. 18) includes examples with several different lanthanides.

[16] The Examiner further concludes that there is no sound prediction for compositions of the formula $[L_{1-x}M_x]_aCu_bO_y$ when x = 0.01B0.67; a = 1, b = 1 and y = 2B4, corresponding to claims 1B4 and 11B15, despite indicating that materials of this formula form part of the factual basis (see para. 18). Absent in the Examiner=s conclusion is any reference to values of >x= greater than 0.67, but we understand this to be an oversight, as it was brought up in the earlier part of the Final Action (para. 19) as well as in three Office Actions previous to the Final Action.

[17] We have proceeded on the basis that the section 2 defect is a result of there being no sound prediction for the utility of compositions of the form $[L_{1-x}M_x]_aCu_bO_y$, where >L= is an untested lanthanide (i.e. compositions for which there is no demonstration of utility when >L= is that particular lanthanide) or a lanthanide combination, and for values for $x > 0.67$ (i.e. 0.667).

THE APPLICANT=S ARGUMENTS

[18] In response to the Final Action, the Applicant argued that:

1) There is no requirement for the Applicant to test and prove the invention in all its claimed applications, relying on *Monsanto v. The Commissioner of Patents* [1979] 2 S.C.R. 1108 (*Monsanto*).

2) The sound prediction requirements elucidated in *Apotex Inc. v. Wellcome Foundation Ltd.*, [2002] 4 S.C.R. 153, 29 C.P.R. (4th) 499 (*Wellcome*) cannot be applied to the present situation, and the present case is distinguishable from *Wellcome* because that judgment dealt with a new use of an old compound, whereas the present claims are for novel compositions. The standard for utility is alleged to differ, it being higher in the case of a new use of an old compound.

3) The specification supports the utility for >x= greater than 0.67, as well as compositions where >L= is Dy, Ho, Tm and Yb and lanthanide combinations. Therefore there is a factual basis for the claims.

4) In order for a lack of utility allegation to be sustainable, there must be evidence that something being claimed lacks utility or evidence that the prediction shown to not be sound, but the Examiner has provided neither.

STATUTORY AUTHORITY

[19] Questioning the soundness of a prediction, as mentioned, falls under the purview of section 2 of the *Patent Act* which includes the requirement that what is invented must be useful. Section 2 defines >invention= as follows:

> Ainvention@ means any new and useful art, process, machine, manufacture or composition of matter, or any new and useful improvement in any art, process, machine, manufacture or composition of matter;

[20] There is an explicit utility requirement (it must be Auseful@), but further clarification on what exactly this means, and how the standard is to be applied to sound prediction, has evolved through the jurisprudence.

[21] The Supreme Court, introduced in *Wellcome* a now oft-cited tripartite test for determining whether a prediction is >sound=. The three elements of the test are:

1. There must be a factual basis for the prediction;

2. The inventor must have at the date of the patent application an articulable and >sound= line of reasoning from which the desired result can be inferred from the factual basis; and

3. There must be proper disclosure

[22] The concept that untested embodiments may be patentable existed in earlier case law (see, for example, *Monsanto* and *Olin Mathieson Corporation v. Biorex Laboratories Ltd.*, [1968] S.C.R. 950), but there was no articulated test for assessing the soundness of a prediction until *Wellcome*.

[23] The relevant date for a sound prediction determination is the filing date (see: *Aventis Pharma Inc. v. Apotex Inc.*, 2005 FC 1283, 43 C.P.R. (4th) 161 at para.164; aff=d on this point 2006 FCA 64, 46 C.P.R. (4th) 401 at para. 30), November 9, 1987.

[24] At the outset it should be noted that the fact that the claims rely on a prediction is not in dispute. Once the claims extend beyond that for which utility has been demonstrated, the Applicant must be relying on a sound prediction to support their claims (see *Eli Lilly Canada Inc. v. Apotex Inc.* 2009 FCA 97, aff=g 2008 FC 142, 63 C.P.R. (4th) 406, at para.18 (*Eli Lilly*)). What logically follows is that predictions are only predictions where not all the claimed embodiments have been demonstrated to work, and the jurisprudence has established that claiming predictions is permitted

provided they are sound. But even when sound, Aa prediction does not need to amount to a certainty@, as we are reminded in *Lundbeck Canada Inc. v. Ratiopharm*, 2009 FC 1102. We can therefore agree with the Applicant=s first argument that there is no requirement for testing and proving the invention in all its claimed applications. There are, however, the requirements of the *Wellcome* test that must be met for the prediction to be considered sound.

[25] What we will do before continuing with the analysis according to the tripartite test is first establish whether a lack of sound prediction can be found when, as in the present application, the compound is new. If the Applicant is correct that the doctrine does not apply to new compounds, or that the standard is much higher for the new use of an old compound compared to a new compound, and therefore distinguishable from *Wellcome* on that ground, then there may not be any need for further analysis along this avenue.

THE DOCTRINE OF SOUND PREDICTION AND NEW COMPOUNDS

[26] The Applicant is of the opinion that the tripartite test set forth in *Wellcome* (i.e. the doctrine of sound prediction) sets the standard Aquite high@, arguing that while this is reasonable where the invention lies in a new use for an old compound, the test is too stringent for new compounds.

[27] While it is acknowledged that the facts of *Wellcome* certainly do differ from those of the present situation, it is settled law that the doctrine does in fact also apply to new compounds. For example, in *Pfizer Canada Inc. v. Apotex Inc.*, 2007 FC 26, 59 C.P.R. (4th) 183 (*Pfizer*) at paragraph 36, O=Reilly J. specifically addressed this point in reference to *Wellcome*:

> While the patent there related to a new use (treatment of HIV/AIDS) for an old chemical compound (AZT), there is nothing in the judgment that leads me to conclude that the principles set out in it do not apply equally to new compounds.

[28] This particular point was further addressed when the case was brought to the Federal Court of Appeal (*Pfizer Canada Inc. v. Apotex Inc.*, 2007 FCA 195, 60 C.P.R. (4th) 177), as stated at paragraph 3 of that judgment:

> The second issue is whether the doctrine of sound prediction applies at all to a claim for a new compound. In our view, it does. This point was most clearly addressed by Justice Binnie in *Apotex Inc. v. Wellcome Foundation Ltd*, [2002] 4 S.C.R. 153 (S.C.C.), in particular at paragraphs 46 and 80.

[29] Therefore, the doctrine of sound prediction is appropriately applied to the utility of new compounds as well as old and, as for the suggestion that the bar is set higher for new uses of old compounds, this argument of the Applicant=s was not substantiated by any jurisprudence, nor could we find any to support such a double standard. In contrast, these two decisions intimate that the same standard applies to new and old compounds equally.

[30] In sum, because the claims extend beyond what was demonstrated to be useful, the utility of the claims must necessarily be relying upon a sound prediction. The concept of sound prediction is clearly not limited to claims to a new use of an old compound, and there is no evident difference in the standard to be applied in the evaluation.

EVIDENCE OF INUTILITY OR THAT THE PREDICTION IS NOT SOUND

[31] The Applicant noted that for the claims to be rejected for lacking utility, there either needs to be evidence of a lack of utility, or there must be evidence presented that shows that the prediction relied upon was not sound. This position was supported by a quotation from *Monsanto* (at paras. 24B25) [original emphasis]:

> In the instant case, the Board, in spite of a complete absence of any evidence of unsoundness of the prediction, deny the claims and would in the end limit them to the area of *proved utility* instead of allowing them to the extent of *predicted utility*. In my view this is contrary to s. 42 of the *Patent Act*.
>
> . . . If the inventors have claimed more than what they have invented and included substances which are devoid of utility, their claims will be open to attack. But in order to succeed, such attack will have to be supported by evidence of lack of utility. At present there is no such evidence and there is no evidence that the prediction of utility for every compound named is not sound and reasonable.

[32] There are two ways in which claims containing a prediction are usually attacked for lack of utility under section 2: either by actually showing that some embodiment lacks utility or, more commonly, that the prediction relied upon to establish the utility in the first place was not sound (see, *inter alia*, the recent decisions: *Eli Lilly*, *Purdue Pharma v. Pharmascience*, 2009 FC 726, *Pfizer Inc. v. Canada (Minister of Health)*, 2010 FC 447).

[33] The distinction between challenges based on a lack of sound prediction and challenges alleging something claimed lacks utility was noted in *Wellcome* at para. 56:

> If a patent sought to be supported on the basis of sound prediction is subsequently challenged, the challenge will succeed if, *per* Pigeon J. in *Monsanto Co. v. Canada (Commissioner of Patents)*, [1979] 2 S.C.R. 1108 (S.C.C.), at p. 1117, the prediction at the date of application was not sound, or, irrespective of the soundness of the prediction, A[t]here is evidence of lack of utility in respect of some of the area covered@.

[34] When the soundness of a prediction is called into question, the implication is that a person skilled in the art could not have soundly made the prediction to begin with and therefore, while the prediction may turn out to have been correct (i.e. the prediction does not include matter that does not work), the Applicant was nevertheless not entitled to make it based on what was known, done and disclosed as of the filing date. *Wellcome* does not suggest that evidence is required to support a lack of sound prediction allegation, as is required when it is alleged that something being claimed does not work. This is not to say, however, that an Examiner can identify a lack of sound prediction without substantiation.

[35] Guidance is provided in section 17.03.04 of the *Manual of Patent Office Practice* (MOPOP) as to the substantiation an Examiner is expected to provide when asserting that claims lack a sound prediction of utility:

> An objection contending an applicant=s sound prediction is flawed should be supported by setting out sufficient facts and reasoning to rebut the applicant=s contention. The applicant must be given a sufficiently clear argument by the examiner that they are able to respond in an informed manner to those concerns raised by the examiner.
>
> . . . . Where the defect is of the nature that no factual basis appears to exist or that no line of reasoning appears to exist (whether by explicit disclosure or in view of the common general knowledge of the person skilled in the art), the Areasoned argument@ can be simply identifying these apparent omissions.

[36] As suggested in this section of MOPOP, depending on the nature of the defect the only realistic option for an Examiner may be to identify omissions in the factual basis and sound line of reasoning. When the defect is identified in the Examiner=s report, it should be clearly shown where the gaps are between the factual basis, the sound line of reasoning, and the prediction made in the claim. It may otherwise be impractical for an Examiner to show that a prediction is not sound via direct evidence of its unsoundness, as the Applicant suggests. The onus is then on the Applicant to address these highlighted gaps, and thus defend the soundness of the prediction, or amend to restrict the prediction to correct the defect.

[37] That said, a balance must be struck during examination, with the Examiner clearly noting why it is perceived that the prediction is not sound, by way of the criteria (i.e. the tripartite test) set forth in *Wellcome*, such that the Applicant can appreciate the case to be met. It should be remembered that an allegation that a prediction is unsound is based on the Examiner=s appreciation of the facts they are aware of. If the case to be met is appropriately presented, it provides an opportunity for the Applicant to alter or correct this appreciation, point out possible oversights, and potentially show that the prediction is in fact sound. Of course, it can also help to clarify how the claims could be amended to comply, and in either event will serve to bring further focus to the issue.

[38] During prosecution of the present application the Examiner addressed the factual basis, sound line of reasoning and proper disclosure requirements, and drew the conclusion that the prediction was not sound across the scope of the claims, with reasons provided. The Applicant was of the opposite opinion but unable to convince the Examiner, and hence the need for this review and recommendation.

CONCLUSIONS FROM THE APPLICANT=S ARGUMENTS

[39] The foregoing addressed the question of whether the doctrine of sound prediction applies to new compounds and if it does, whether the standard is lower for predicting the utility of new compounds than for new uses of old ones; the former in the affirmative, the latter in the negative. Also addressed was what is required of the Examiner in alleging that a claim lacks a sound

prediction of utility.

[40] The final argument presented by the Applicant to traverse the sound prediction defect is that the specification supports the utility of values for >x= greater than 0.67, as well as compositions where >L= is Dy, Ho, Tm, Yb, or combinations thereof. The Applicant points to several passages in the disclosure that seem to support this position, but simply stating the utility is insufficient on its own to lead to a finding that the prediction is sound. Instead, that determination must be made via the tripartite *Wellcome* test, which we address in our analysis, below.

ANALYSIS B SOUND PREDICTION

[41] To determine whether the predictions in the claims appear to be sound, we will consider the disclosed factual basis and sound line of reasoning for the factors highlighted in the Final Action, and which appear to be the crux of the Examiner=s position (reordered from para. 19):

(1) where >L= is Dy, Ho, Tm or Yb (untested lanthanides)
(2) mixtures of lanthanides
(3) values of >x= greater than 0.67

>L=CUNTESTED LANTHANIDES

[42] The Examiner stated in the Final Action that the utility of compositions where >L= is an untested lanthanide (Dy, Ho, Tm or Yb) has been established for compositions of the formula $LM_2Cu_3O_y$ from claims 5 and 8, but not for the formula $[L_{1-x}M_x]_aCu_bO_y$ as in claims 1B4 and 11B15. This is in spite of $LM_2Cu_3O_y$ being the equivalent of $[L_{0.33}M_{0.667}]CuO_y$ (see paras. 9B12 and Table 1), which is the subject-matter of claim 3. As noted at para. 12, this appears to have been overlooked during examination because it was not apparent that $LM_2Cu_3O_y$ could be reformulated to $[L_{0.33}M_{0.667}]CuO_y$, owing to the very different form used to represent this particular species relative to all the others in the claims.

[43] The utility of the untested lanthanides in the compositions of formula $[L_{0.33}M_{0.667}]CuO_y$ was established not by demonstration, but by relying on a sound prediction. Of the 15 lanthanides in the claims, seven were demonstrated to be useful, while the remaining four were untested. Shown below is the lanthanide series with those underlined being the elements demonstrated to have utility, while the predicted ones are in boldface:

$^{57}\underline{\text{La}}$, ^{58}Ce, ^{59}Pr, $^{60}\underline{\text{Nd}}$, ^{61}Pm, $^{62}\underline{\text{Sm}}$, $^{63}\underline{\text{Eu}}$, $^{64}\underline{\text{Gd}}$, ^{65}Tb, ^{66}**Dy**, ^{67}**Ho**, $^{68}\underline{\text{Er}}$, ^{69}**Tm**, ^{70}**Yb**, $^{71}\underline{\text{Lu}}$

[44] The untested lanthanides can be seen to all fall between one or more of those demonstrated to have utility. As noted in the chemistry textbook *Inorganic Chemistry* (Philips, C.S.G. and

Williams, R.J.P., Volume II; Oxford University Press: New York, 1966 at p. 97), the chemical properties of the trivalent lanthanides are extremely similar; there are relatively small changes in the chemical properties of the lanthanides and there is a trend to smaller ionic radius across the series. Each of these speaks to the expected predictability present in the series, and each of the predicted lanthanides is flanked by one or more tested ones. We therefore find no reason to expect that the untested members in the series will differ markedly either chemically or physically from those that were, without evidence to the contrary.

[45] At least for these reasons, we can agree with the Examiner that the prediction for L = Dy, Ho, Tm and Yb is sound. Where we disagree with the Examiner is that we cannot see why this would only apply to compositions of the formula $LM_2Cu_3O_y$ ($[L_{0.33}M_{0.667}]CuO_y$). The reasoning should also apply to compositions of the formula $[L_{1-x}M_x]_aCu_bO_y$, with the other definitions of the subscripts found in the cited claims, since no justification has been presented for rejecting the prediction in compositions having different values for >x=.

[46] For the foregoing reasons, we do not see sufficient grounds for concluding that the compositions of the formula $[L_{1-x}M_x]_aCu_bO_y$, where >L= is an untested lanthanide (Dy, Ho, Tm and Yb) lack a sound prediction of utility; *viz.* that the composition will be able to achieve zero electrical resistance at the claimed critical temperatures.

>L=CCOMBINATIONS OF LANTHANIDES

[47] The Examiner indicates that there is no factual basis to conclude that combinations of lanthanides would work, including combinations of those which were individually demonstrated to have utility. The fact that there are no specific examples provided that incorporated mixtures of >L= does not necessarily lead to the conclusion that the prediction of their utility is unsound.

[48] Looking to the disclosure, there is reference at pages 13B14 to the partial substitution of lanthanum atoms with yttrium (itself not a lanthanide, though it shares similar chemical properties with that group and is included with them under the rubric of Arare earth elements@) or with lutetium (Lu), and the consequent increase in transition temperature this afforded:

> The transition temperature of such oxide complexes is enhanced by the application of pressure . . . an enhancement of transition temperature . . . may be produced without the application of extrinsic pressure by employing in the formation of the oxide complex an alkaline earth metal having smaller atomic radius than that of barium. A similar enhancement of transition temperature has been observed when yttrium is used as the AL@ component rather than lanthanum.
>
> . . .
>
> Similarly, complete or partial substitutions of the lanthanum atoms . . . with the smaller lutetium atoms . . . or yttrium . . . will provide this same effect.

[49] These passages strongly suggest that at least those substitutions were made and the effects

thereof observed, but the actual data were not included in the disclosure. The lutetium substitution in particular speaks to the combinations of lanthanides providing a reasonable expectation of success, bearing in mind that lutetium is at the other end of the series and would be expected to differ most markedly from lanthanum in comparison to the other lanthanides. The fact that a beneficial result was reported from these substitutions weighs on the side of finding that the prediction that the others will work as well is indeed sound.

[50] Further, the conclusions drawn at page 16 of the disclosure should be considered; specifically, that AThe observation of superconductivity . . . clearly demonstrates that superconductivity in this class of compounds is not sensitive to >L=@. This conclusion was based on data derived from compositions of the form $[L_{0.33}M_{0.667}]CuO_y$ made with each of the tested lanthanides, finding that the effect on the T_c was not dramatic, suggesting that the choice of >L= is less critical. This also seems to fit with the deduced structural arrangement of the phase that allows for a high T_c to be achieved: a ACuO_2BBaBCuO_2BBaBCuO_2 plane assembly sandwiched by two layers of L-atoms.@ (page 16).

[51] The foregoing provides a factual basis in the form of compositions involving the partial substitution of lanthanum, and a sound line of reasoning in the form of the observation that the size of the >L= atom is less important, except that if anything a decrease in atomic radius may provide an enhanced effect by decreasing the interatomic spacing of the complexes. It is again noted that the chemical properties of the lanthanides are relatively consistent, and there is a clear trend in atomic radii that would aid in predicting the effect such substitutions would make.

[52] We therefore also disagree with the Examiner that utility of $[L_{1-x}M_x]_aCu_bO_y$ with combinations of lanthanides in >L= would not be soundly predictable from the factual basis provided. This applies to the tested and untested lanthanides alike, as well as combinations including members of both groups. It is also noted that to some extent the Examiner may have come to similar conclusions, once again bearing in mind the equivalence of the formulae $LM_2Cu_3O_y$ and $[L_{0.33}M_{0.667}]CuO_y$, since mixtures of these species are also claimed in claims 5 and 8, but those claims were not identified in the Final Action as defects under section 2.

VALUES FOR x > 0.67

[53] What is left to determine is the soundness of the prediction, as it applies to compositions of the formula $[L_{1-x}M_x]_aCu_bO_y$, where $x > 0.67$, specifically up to 0.80 (claims 1 and 2) or 1.0 (claims 11B15), having the utility of exhibiting zero electrical resistance at a temperature of from 70B98 K (claims 1 and 2) or 40B54 K (claims 11B15).

[54] As noted previously, there are a number of examples which support claims to a range for

x = 0.01B0.67 (para. 18). Additionally, there is the statement at page 5 of the disclosure indicating that Aoxide complexes having superconductivity in the 90EK range are produced wherein . . . Ax@ is from about 0.65 to about 0.80, preferably about 0.667.@

[55] Although data is typically the most self-evident form a factual basis can take, other information apart from numerical data can also be factored into it. In this case, compositions are taught that are said to give the promised result, but for which precise T_c data and the exact values for >x= made were not disclosed. From page 5 of the disclosure:

> It has also been found that oxide complexes having superconductivity in the 90EK range are produced wherein . . . Ax@ is from about 0.65 to about 0.80, preferably 0.667. Such oxides may be produced to have unique square planar AA@-atoms each surrounded by four oxygen atoms. The 90EK range for superconductivity of such oxides where AA@ is copper and AM@ is barium is believed to be attributable to the quasi-two-dimensional assembly of CuO_2BBaBCuO_2-layers sandwiched between two AL@ layers.

[56] According to the disclosure then, evidence exists which supports values for >x= in the range of 0.65B0.80. Since x = 0.667 corresponds to the superconductive phase ($LM_2Cu_3O_y$), there are plenty of data to support that value, so the above statement is being relied upon for establishing that the other values of >x= from 0.65B0.80 also are superconductive at temperatures of 70B98 K.

[57] Although not tabulated data, it is taught that values up to x = 0.80 have been found to be superconductive in the 90 K range. We see no reason to doubt this information, and take it at face value as part of the factual basis. The values are not given by way of parroting the claim language, nor are they being set forth in the context of summarising the extent of the invention the inventor believes to have invented. Instead, there is explicit teaching that the range of x = 0.65B0.80 was found to have the promised utility and so must conclude that the factual basis extends to x = 0.80.

[58] The factual basis covers values of >x= from 0.65 to 0.80. Even though unlikely that every value for >x= between 0.65 and 0.80 was tested, even if they were not, the sound line of reasoning connecting those that were to those predicted would simply be that the other values not tested are filling in the omissions in the series of >x= values shown to be useful. Therefore, the disclosure indicates that values of >x= as high as 0.80 were found to be useful, so between that and the bottom end of the range (0.65) the untested >holes= in the factual basis could be plugged by merely observing the trend on either side of the omission.

[59] In light of the foregoing, we find that whether or not the entire range of x = 0.65B0.8 is accepted as forming part of the factual basis, there is a sufficient line of reasoning to predict that the untested values in the range would have utility from the factual basis that reaches x = 0.67. We find that, on the balance of probabilities, values for >x= extending to 0.80 would be expected to have the claimed utility.

[60] It will be remembered that claim 11 (and therefore dependent claim 12) includes compositions where x = 1. For such compositions, the situation is markedly different. When x = 1, there is no >L= component in the material at all. Although there is mention of this value in the disclosure, in contrast to the explicit teaching that x = 0.65B0.80 was found to have utility, it is read to be a mere summary or generalisation of the invention taught. There is no specific assertion that compositions with x = 1 were found to work, as there was for values of >x= up to 0.80. Although it is difficult to determine what proportion of >L= must be present in order to allow the material to become superconductive at the given transition temperaturesCi.e. what the highest acceptable value for >x= isCwhat can be concluded is that there must be *some*.

[61] This conclusion is based on the fact that the entire teaching of the disclosure illustrates the reliance on a rare earth element being present in the formula, even if the choice of which is less critical. Aside from not teaching anything directly that would lead a person skilled in the art to the conclusion that >L= could be omitted completely, there are repeated mentions of >L=, and its effect on the properties of the materials.

[62] As noted previously (see para. 57), there was mention early in the disclosure of the proposed role >L= plays in the structure. Again, at page 15 of the disclosure, the belief is forwarded that the high temperature superconductivity is associated with:

> . . . the CuO_2BBaBCuO_2BBaBCuO_2 plane assembly sandwiched between the >L=-layers. The significance of the inter-plane coupling within the layer-assembly is especially evident from the enhanced superconducting transition from ~30EK in the K_2NiF_4 like structure LaBBaBCuBO or LaBSrBCuBO type oxide . . . to ~90EK . . .

[63] Following this is some further discussion of the structure of the compositions and then, at page 16:

> The present results, therefore, strongly suggest that superconductivity in $LBa_2Cu_3O_{6+\delta}$ class must be associated with the CuO_2BBaBCuO_2BBaBCuO_2 plane assembly sandwiched by two layers of L-atoms . . .

[64] Based on the repeated mentions of the role >L= plays in the materials throughout the disclosure, we conclude that >x= cannot equal 1, because there must be some >L= present for the promise of superconductivity to be realised. There is no factual basis to support this absence, nor is there a sound line of reasoning to extend the prediction up to x = 1, based on what was disclosed. Further, this technology was a nascent one at the time of filing, and it would not be expected that there would be common general knowledge from which the person skilled in the art could draw that would contradict this position.

PROPER DISCLOSURE

[65] As for proper disclosure, this requirement of the test is that the factual basis and the sound line of reasoning be found in the disclosure. In the present case, all the compositions forming the factual basis were taught, as was the information used to establish a sound line of reasoning. For this reason, we conclude that the proper disclosure criterion has been satisfied.

CONCLUSIONSBSOUND PREDICTION

[66] Claims 1B4 and 11B15 were rejected for not being directed to a sound prediction, but we have reached the opposite conclusion for claims 1B4. We are of the view that there is sufficient factual basis and sound line of reasoning disclosed to reasonably conclude that the untested lanthanidesCand combinations of lanthanides, whether they be tested or untestedCas well as values of x = 0.01B0.80 would have the promised utility. For this reason, we cannot agree with the Examiner=s rejection of claims 1B4 on that ground.

[67] With respect to independent claim 11, we have found that there can be no sound prediction of utility for values of x = 1; the claim should therefore be refused in its present form. Dependent claim 12 only restricts >M= to barium and therefore does not remedy this defect. Claim 13, however, restricts >x= to 0.65B0.80, which range we have found to be soundly predictable, and claims 14 and 15 depend from claim 13, so the same applies. Incorporating the limitations of claim 13 into claim 11 (with the deletion of present claim 13) would serve to render the independent claim acceptable, and otherwise preserve the subject-matter of dependent claim 12.

2. DESIRED RESULT

[68] The second ground for rejection presented by the Examiner in the Final Action is that claims 1B10 do not comply with subsection 34(2) of the *Patent Act*, for being directed to a desired result.

STATUTORY AUTHORITY

[69] This defect was identified under is subsection 34(2) of the *Patent Act*, which reads as follows:

> 34(2) The specification referred to in subsection (1) shall end with a claim or claims stating distinctly and in explicit terms the things or combinations that the applicant regards as new and in which he claims an exclusive property or privilege.

THE EXAMINER=S POSITION

[70] This defect was first identified in the Final Action, and is reproduced below in its entirety:

> Claims 1 to 10 do not comply with subsection 34(2) of the *PATENT ACT* in effect just before 1 October 1989. The claims do not define the composition in distinct terms, relying for distinctiveness upon the functional qualification Awhich is superconductive at a temperature of 701K and higher up to 981K@. In effect, the material is being claimed by the desired result without defining the necessary conditions to achieve that result.
>
> > The composition is claimed by its chemical formula only (except for the functional qualification). The paper submitted (PH Hor et al, ASuperconductivity above 90 K in the Square-Planar Compound System $ABa_2Cu_3O_{6+\delta}$ with A=Y, La, Nd, Sm, Eu, Gd, Ho, Er, and Lu@ in *Physical Review Letters* Vol 58 No 18 (4 May 1987)) states on page 1892 that A. . . all these compounds can be made insulating, partially superconducting, or completely superconducting by our varying the reaction atmosphere and the quenching rate while keeping the compositions unchanged.@ Consequently the Applicant is using his desired result to restrict his claims to the compositions that he sought to make.

[71] From the above, the arguments to be addressed with respect to claims 1B10 are:

$ The compositions are being claimed by a desired result without defining the necessary conditions to achieve that result.

$ The claims do not define the compositions in distinct terms, instead relying on a functional qualification: the temperature at which they become superconductive.

$ Because the compositions are claimed by their chemical formulae alone, the Applicant is using the desired result to restrict the claims to the compositions he sought to make, and compositions according to the formulae will not necessarily have the stated utility.

[4] The Examiner therefore appears to take issue with the way in which the compositions are claimed in general, touching on issues of claim breadth and consequent possible lack of utility. These will therefore be addressed in our analysis.

THE APPLICANT=S ARGUMENTS

[5] In response to the Final Action, the Applicant=s paraphrased arguments were:

$ The claims are not directed to a desired result, and functional language in a claim is acceptable, according to *Burton Parsons Chemicals Inc. v. Hewlett-Packard (Canada) Inc.*, [1976] 1 S.C.R. 555 (*Burton Parsons*), and serves to distinguish the compositions from the art.

$ A person skilled in the art would have no difficulty with the language of the claims.

$ A person skilled in the art would know how to vary the reaction conditions in order to obtain the compositions capable of superconductivity.

$ The Manual of Patent Office Practice (MOPOP) advises that product claims may be defined in three ways: by structure, in terms of the process by which the product is made, or in terms of its physical or chemical properties. The Applicant has defined the compositions in terms of their chemical structure and properties, and should thus be acceptable.

ANALYSISCSUBSECTION 34(2)

[5] We will consider each of the points raised by the Examiner, as summarised above, combining them where convenient, and referring to the Applicant=s arguments where appropriate.

[6] The first point to be addressed is that claims 1B10 are directed to a desired result without giving the necessary conditions to achieve the result.

[7] Whether or not a claim to a mere desired result is a defect does not appear to be at issue. The Examiner suggests that, absent any Anecessary conditions@ (we understand this to mean structural or process limitations) the Amaterial is being claimed by the desired result without defining the necessary conditions to achieve that result@. We do not agree with the Examiner. The claims include a limitation on which atoms are present in the material, their proportions and amounts, by way of the formulae. Although there may be many compounds that satisfy them, the formulae nevertheless substantially restrict the scope of the claim in a meaningful manner by including these features.

[8] We therefore cannot agree that the claims are directed to only a desired result, or that they merely repeat the research objective. As we will discuss, having a desired result appended to a claim is not a defect, *per se*; the result serves as a functional limitation on the claim that may be in fact be completely appropriate and acceptable. *Burton Parsons Chemicals Inc. v. Hewlett-Packard (Canada) Inc.*, [1976] 1 S.C.R. 555 (*inter alia*) sets precedence for such limitations being acceptable in the claims.

[9] In *Burton Parsons*, an electrocardiograph cream for use with skin contact electrodes and compatible with normal skin was claimed that comprised a stable aqueous emulsion containing a highly-ionizable salt. The court recognised that:

> If the patent is to have a practical value, it must cover all the emulsions and salts which can yield the desirable result namely, all Aemulsions with the outer phase or the continuous phase being water@ and

> all salts that are highly ionizable enough to carry an electric current with low resistivity on the skin excluding only such substances as are not compatible with normal human skin. The evidence makes it clear that this was obvious to any person skilled in the art because the characteristics of suitable emulsions and of suitable salts were well known. Only the combination was new.

[10] In that case, the functional limitations imposed on the cream (skin compatible and good conductivity) and the salts (highly-ionizable) were considered appropriate to allow for claims to what was considered the deserved scope of protection.

[11] Therefore, contrary to the Examiner=s position, we are of the view that the desired result may be an important feature to have in the claims; it was in *Burton Parsons*, and is in the present case. The desired result may appear in a claim to disclaim subject-matter never intended to be claimed and to provide a context for what the claim defines. In other words, it helps inform the skilled person what the scope of the monopoly is. On the other hand, the desired result must be achievable by a person skilled in the art across the scope of the claims, based on the common general knowledge said person would be expected to possess, supplemented by the teaching of the disclosure. More will be said on this, below. We therefore do not find that including mention that the compositions are superconductors with zero electrical resistance at or above the given transition temperatures results in contravention of subsection 34(2), since that is what was stated to be invented and is a statement of the promised utility of the compositions.

[12] The next point to be addressed is that compositions according to the formulae will not necessarily have the stated utility, the implication being that further definition is thus needed to avoid those that do not. In the disclosure, it is evident that not all nominal compositions will fulfil the promised utility; whether they will is a function of how the samples are prepared. According to page 17:

> Sample preparation parameters can affect the electronic and magnetic properties of the $LM_2Cu_3O_{6+\delta}$ class of oxide compounds drastically. It has been observed that the formation conditions for $LBa_2Cu_3O_{6+\delta}$ for different AL=s@ are different. The reaction time, the reaction temperature, the quenching rate, the reaction atmosphere and the compositions are all inter-related. For instance, oxide complexes within this class can be made insulating, partially superconducting or completely superconducting by varying the reaction atmosphere and the quenching rate while keeping the compositions unchanged.

[13] There can therefore be little doubt that not all possible compositions that satisfy a given nominal formula in the claims will have the desired result/promised utility (they may even be insulators). While on its face this may seem problematic, the reality is that in fields such as ceramics/materials, where the exact structure of a product may defy full elucidation, it may be reasonable to claim the product by the nominal formula coupled with a functional limitation in the form of a desired result. Whether it is appropriate will depend, *inter alia*, on whether there is sufficient teaching to enable a person skilled in the art to achieve the desired results for the range of compositions the formulae encompass.

[14] Section 17.07.04 (January 2009) of MOPOP discusses some considerations to be made in

dealing with functional limitations in claims. The following is excerpted from that section:

> Functional limitations must always be considered from the perspective of the person skilled in the art, and the question to be asked is: Acan the person skilled in the art practice the full breadth of the claim without recourse to inventive ingenuity?@

[15] The quote within the passage encapsulates the main question to be answered in determining the propriety of the functional limitation in the claims because, while functional language may be allowed in general, not all such limitations will pass muster in all situations (see the example in this MOPOP section for instance); the determination is made based on the facts of the case.

[16] What therefore needs to be addressed is whether a person skilled in the art could in fact practice the full breadth of the claims without having to resort to doing something inventive to make the invention they define work.

[17] The Examiner also argues that the Applicant is relying on the desired result to Arestrict the claims to the compositions he sought to make.@ By this we understand the Examiner to mean that the formulae are provided, but the desired result is appended to the claim to disclaim those that do not work. The implication is that further definition of the compositions is needed in the claims to avoid those ones. This is a situation that can be addressed in reference to the excerpt from the MOPOP section quoted, above. The claim is functionally limited, and the appropriateness of this is related to the extent to which the person skilled in the art is able to Apractice the full breadth of the claim without recourse to inventive ingenuity.@

[18] As is evidenced by the fact that compositions represented by the same formula can be superconductive, insulating, or something in between, these materials are highly process dependent. In addition to the above, there is further evidence of this gleaned from a few other places in the disclosure. From page 4, it is shown that the transition temperature is directly affected by the preparative process used:

> The oxide complexes of the invention are prepared by a solid-state reaction procedure which produces an oxide complex having an enhanced superconducting transition temperature compared to an oxide complex of like empirical composition prepared by a coprecipitation-high temperature decomposition procedure.

[19] This shows that an alternative synthetic route can significantly affect the outcome. This is not inherently problematic provided the inventor teaches how to be successful and avoid useless embodiments.

[20] Pressure was noted in several places to have an effect on the T_c as well, such as at page 12:

> Pressure has been found to enhance the T_c of LaBBaBCuBO and LaBSrBCuBO oxide complexes . . . Although the unexpected enhancement of transition temperature that the application of pressure to such oxide complexes produces has been repeatedly observed, a mechanism which adequately explains the

pressure effect has not yet been fully determined.

[21] The disclosure further discusses various factors such as heat, temperature, oxygen concentration, etc. that dictate the final product and explains how to monitor the reaction for the formation of the desired product (page 17).

[22] Therefore, it is clear that these materials were the products of a monitored and deliberate protocol that the person skilled in the art is instructed to follow. The instructions for so doing were provided in the disclosure and are understood to be supplemented by the skilled worker=s common general knowledge, while allowing routine experimentation to get it right. In this case, the person skilled in the art would be expected to, armed with an understanding of what the relevant experimental parameters are and how to monitor the reaction to ensure the superconductive phase is being formed, be able to adjust the reaction conditions to get the desired results. Based on the detail in the disclosure, we find that a person skilled in the art would not have to exercise undue or inventive effort or experimentation to make a given composition of the formulae achieve these results. Relating this back to para. 92, the full breadth of claims 1B10 could be practised by a person skilled in the art without inventive effort as a result of the detailed disclosure and the degree of enablement it affords.

[23] As noted by the Applicant, MOPOP (section 11.08) endorses claiming products in one of three different ways: by structure, in terms of the process by which they are made, or in terms of their physical or chemical properties. While it is appropriate to claim the present superconductors via the processes by which they were made, the latter is also befitting the technology.

[24] In finding that the disclosure would guide the person skilled in the art in making compositions falling within the scope of claims 1B10 with the promised utility we are also stating that, at least in this case, further limitations on the claims are not necessary, and the skilled worker would be informed how to avoid inutile embodiments. Therefore, we find that the extent of the disclosure supports the claiming of the formulae, restricted to not only the *desired* but the *achieved* result via a functional limitation.

CONCLUSIONSCSUBSECTION 34(2)

[25] In view of the foregoing, we do not agree that the claims are indistinct, or otherwise non-compliant. For that reason, we do not agree with the Examiner=s assessment that claims 1B10 do not comply with subsection 34(2) of the *Patent Act*.

>OLD ACT= CONSIDERATIONS

[26] Since this application was filed under the auspices of the *Patent Act* as it read immediately

before October 1, 1989 (i.e. the >Old Act=), there remains the requirement that otherwise allowable claims be evaluated under section 43 to determine whether conflict proceedings are warranted. Such an evaluation is made by an Examiner charged with the task. The potential involvement of, and impact on, third parties necessitates this two-stage approach. The application will therefore be returned to the Examiner for this determination, subsequent to the completion of the required Rule 31(*c*) amendments in accord with this Decision.

RECOMMENDATION AND RULE 31(*C*) AMENDMENTS

[27] In summary, it is our recommendation that:

(1) The rejection of claims 1B4 and 13B15 under section 2 of the *Patent Act* be reversed;

(2) The rejection of claims 11 and 12 under section 2 of the *Patent Act* be upheld; and

(2) The rejection of claims 1B10 under subsection 34(2) of the *Patent Act* be reversed.

[28] We further recommend that, in accordance with paragraph 31(c) of the *Patent Rules*, the Commissioner inform the Applicant that the following amendment is necessary for compliance with the *Patent Act*:

(1) Claim 11 must be amended to incorporate claim 13, thereby preserving the subject-matter of claim 12. Alternatively, claims 11 and 12 may be deleted. In either case, the remaining claims must also be renumbered accordingly.

[29] Finally, we recommend that:

(2) the Applicant be invited to make only the above amendment within three months from the date of the Commissioner=s Decision;

(3) the Applicant be advised that, if the above amendment and only the above amendment, is not made within the specified time, the Commissioner intends to refuse the application; and

(4) the Applicant be advised that, if the above amendment and only the above amendment, is made within the specified time, the Commissioner intends to return the application to the Examiner for allowance, unless proceedings under section 43 of the *Patent Act* are required.

Ryan Jaecques		Mark Couture		Paul Sabharwal
Member		Member		Member

COMMISSIONER=S DECISION

[30] I concur with the findings and recommendations of the Patent Appeal Board. Accordingly, I invite the Applicant to make the above amendment, and only the above amendment, within three months from the date of this Decision. If this amendment, and only this amendment, is made within the specified time, the Examiner=s rejection will be considered to have been overcome. The application will then be returned to the Examiner for possible proceedings under section 43 of the *Patent Act*.

Mary Carman
Commissioner of Patents

dated at Gatineau, Quebec,
this 20th day of January, 2011.