

## THE NAMING OF MINERAL SPECIES APPROVED BY THE COMMISSION ON NEW MINERALS AND MINERAL NAMES OF THE INTERNATIONAL MINERALOGICAL ASSOCIATION: A BRIEF HISTORY

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### ABSTRACT

I present an overview of the origins and the history of the CNMMN, the naming of mineral species and the IMA system of numbering those new species. Where published, the equivalence between an IMA number and a name or composition is provided. I discuss the manner in which these IMA numbers came to be published, as they were originally confidential, and many still are. I highlight the role of various individuals in creating the system for naming mineral species as it exists today.

**Keywords:** Commission on New Minerals and Mineral Names, CNMMN, Committee on Nomenclature and Classification of Minerals, grandfather clause, history, IMA, IMA numbers, International Mineralogical Association, nomenclature.

### SOMMAIRE

Je présente ici une vue d'ensemble des origines et de l'évolution de la Commission des Nouveaux Minéraux et des Noms de Minéraux, de l'attribution d'un nom à une espèce nouvelle, et du système de numérotation des cas traités par la Commission. Où cette information est divulguée dans la littérature, je présente l'équivalence entre numéro attribué et nom de l'espèce. Je discute de la raison pour laquelle ces numéros en sont venus à être publiés, étant d'abord jugés confidentiels; plusieurs le sont toujours. Enfin, je souligne le rôle de plusieurs individus dans la création du système actuel de nomenclature des espèces minérales.

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**Mots-clés:** Commission des Nouveaux Minéraux et des Noms de Minéraux, CNMMN, Comité sur la Nomenclature et la Classification des Minéraux, clause de droits acquis, histoire, Association internationale de Minéralogie, IMA, numéro de dossier IMA, nomenclature.

### INTRODUCTION

Minerals have been given names since the beginning of recorded history. Only in the last half century has there been a concerted effort on an international basis to regulate the nomenclature of minerals. It has now become an established procedure in any description of a new mineral species to submit a complete proposal to the Commission on New Minerals and Mineral Names (CNMMN) of the International Mineralogical Association (IMA). Only once approval is granted can the paper describing the new species be published. At that point, authors are asked to make mention that approval of the mineral and the new name has been granted. In this article, I deal with the historical development of this process, and how it has evolved since the founding of the IMA. I also deal with the "IMA number", what this

number entails and how it came to be. I have adopted the practice of Michael Fleischer, Max Hey and François Permingeat of writing approved names in bold and a practice common in Europe of capitalizing mineral names to make them more apparent and to visually distinguish them from names not approved by the CNMMN. Where a name of a mineral species is not IMA-approved, the name is shown in quotation marks in this paper.

### HISTORICAL ASPECTS

The International Mineralogical Association was founded by a group of mineralogists from around the world at a meeting in Madrid in 1958. The CNMMN, one of the original eight commissions, was founded in 1959. It is probably the most recognizable of the com-

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missions to both amateur and professional mineralogists, as it deals with the approval and naming of mineral species and has final jurisdiction on the nomenclature of all minerals, as defined by the CNMMN. The founding of the CNMMN marked a turning point in the history of mineral nomenclature. Up until that time, the naming of minerals had been a haphazard and inexact aspect of our science at best. This new commission had at the heart of its mandate to put order into many centuries of conflicting and divergent methods of giving names to naturally occurring chemical substances. There clearly had been less-than-adequate agreement on what constituted a mineral at that time, and of course in preceding years. In fact, many mixtures of minerals and most biogenic substances, such as amber or coal, were included in early treatises on minerals. Note that the definition of what constitutes a mineral has changed over the years. The currently accepted definition was published by Nickel (1995).

Before the founding of the IMA and its various commissions, the naming of a mineral typically was done by the person (not necessarily a scientist) who found the material, unfettered by any proscribed set of rules. The descriptions varied greatly according to the skill of the discoverer first describing the mineral, the political climate, the place of residence, language, and the ability to obtain and exchange information on the newly found minerals. The literature is full of procedural models with respect to nomenclature and an enormous number of superfluous, erroneous or fanciful names.

One of the earliest models for a system of the nomenclature of minerals was proposed in the 18<sup>th</sup> century by Carl von Linné, who tried to apply a system of two Latin words, as had been developed for fossils and all living things. This system was used for a time but fell out of use for minerals. It is still the system of classification in use for fossils and biological taxonomy.

A more recent attempt to develop a universal system for the naming of minerals is that of Povarennykh (1972). The model he proposed to the mineralogical community in his book *Crystal Chemical Classification of Minerals* would maintain a one-word name with "ite" as a suffix, but the name itself would reflect the chemical composition and crystallography of the mineral. In his system, which was not formally presented to nor adopted by the CNMMN, Povarennykh even proposed the renaming of all known minerals as well as a chemical redefinition of many of them.

#### *Before the CNMMN*

A significant event occurred on a national level in the United States, in December of 1920, at the first annual meeting of the Mineralogical Society of America (MSA). A "Committee on Nomenclature and Classification of Minerals" (CNCM) was struck in order to bring some order to the naming of mineral species. This committee submitted its preliminary report in 1921 and

published its first full report in December 1922 (Foshag *et al.* 1923). The issues being discussed then by the committee members represent the first attempts to bring a logical and ordered procedure to the naming of minerals, albeit at a national level.

At a meeting of the British Association for the Advancement of Science, held in Toronto on August 8, 1924, Leonard J. Spencer of the British Museum (Natural History) presented a paper outlining the need for an "international committee (...) in order to arrive at the best names and terms for international use." He added, "science is world-wide, and its language should, as far as possible, be adapted to meet international needs", in order to avoid confusion. In his notes, Spencer indicated that he discussed the advantages of his ideas with "several American mineralogists" in Washington (Spencer 1925).

The second CNCM report was published in 1936 (Kerr 1936) following its presentation at the 16<sup>th</sup> meeting of the MSA, a full thirteen years after the first report. Kerr's report is of interest because committee members discussed concrete efforts to come to some international agreement. Three meetings of the CNCM had been held: the first in Toronto (1930), and the second and third in Washington in 1933 and 1935, respectively. A key player was L.J. Spencer who tried, together with other members of the Mineralogical Society of Great Britain and Ireland and his counterparts at the MSA, to achieve agreement of "English-speaking peoples" on mineral nomenclature.

Although not totally successful, the committee did report that some joint agreement among the Americans, British and Canadians did emerge. Note that as the Mineralogical Association of Canada was founded in 1955, Canadian mineralogists could either join the Mineralogical Society of America or be elected to membership in the Mineralogical Society (UK). At the first meeting in Toronto, it was agreed that no recommendation would be made unless the committee approved it unanimously, that any changes should be simple and clear, and that well-established practice should not be changed. Spencer stated, "It is not the slightest use to propose any drastic changes." The desire for international cooperation with a conservative approach has continued to this day. In fact, the mineral names approved in that report of mineral species (Kerr 1936), with only minor exceptions, have become part of accepted nomenclature.

One sees in these reports the beginnings of what would one day become the CNMMN. It did not take long, in fact, before it became clear that the proposed changes were insufficient. The idea for the creation of the CNMMN had been launched, but it would only come to fruition many years later, after the end of World War II.

In the 1950s, the turning point was at hand. Max Hey, of the British Museum (Natural History), published his seminal work *An Index of Mineral Species and Varieties Arranged Chemically* (1955). This book (also

known as “Hey’s Index”) helped put order to the myriad of names that the CNMMN would inherit at its birth by the end of the very same decade.

Spencer, in many ways the spiritual father of the CNMMN, lived long enough to witness the creation of the IMA and the CNMMN; he died in April of 1959, shortly after the Commission’s first meeting. His legacy was comprised of countless mineral abstracts, and lists on new minerals and mineral names (Nos. 1–21) published by the Mineralogical Society (UK).

#### *After the creation of the CNMMN*

Initial reports of the CNMMN followed a form similar to that of the first report of the American CNCM mentioned above. The main differences were that the names of countries represented by voting members and the number of votes for and against new mineral names were recorded. Unfortunately, the names of the voting representatives were not recorded for posterity.

The first report of the CNMMN was made at the second general meeting of the IMA in Copenhagen in 1960. In all, representatives from six countries (Bulgaria, Canada, France, Japan, the United Kingdom and the United States) voted on the new minerals named in the list. Interestingly, half of the voting members came from countries that were also involved in Spencer’s original effort to get such a committee formed. In these days, votes were cast in person at the IMA meeting, not by mail or by e-mail as is done now. Presumably the voting was accompanied by an airing of contentious issues in a way that is not possible today.

The first Chairman of the CNMMN was Michael Fleischer (United States), the first Vice-chairman of the Commission was Max Hey (United Kingdom), and the first Secretary was François Permingeat (France). All played key roles in the founding of the IMA. By the time the second list was voted on, Germany, India and Italy had joined the other voting members on the committee. It was not until 1972 that the Soviet Union, a founding member of the IMA, had a voting representative on the CNMMN (although it had already established a national commission).

From the beginning of the CNMMN, the IMA published lists of new minerals. The lists prepared by François Permingeat are the most complete and contain the only public record to date of votes cast in favor or against proposals for new mineral species. Permingeat also included information on minerals that was published before they received CNMMN approval, and votes on discreditations. As well, his lists include the number of abstentions and, in earlier reports, the date the lists were prepared and the site of CNMMN meetings at which the votes took place.

During the first years, the role of the CNMMN in the naming of minerals was somewhat secondary, as most authors did not submit themselves to the IMA’s authority. Of the new minerals approved by the Com-

mission on the third list, in 1961 (Table 1), none had been approved by the CNMMN before publication. In the 1966 list, 26 new mineral names were approved by the CNMMN before publication, but an additional ten were approved only after the name had been published. Still another 27 names that were already in the published record were rejected by the CNMMN! These statistics show that the CNMMN still had some way yet to go to fulfill its mandate. That said, some of the minerals that were rejected were eventually identified as distinct species. On the 1966 list, **Perryite** was eventually accepted, and “Orthorhombic laventite” was eventually described as **Burpalite**, for example.

The situation continued to improve so that when the 1972 list was published in 1974, the name of only one of the 38 new minerals had appeared in the literature before being approved by the CNMMN. The last list (1979) was published by the CNMMN in 1982. After that, the lists of new mineral species were published in the literature with a comment indicating that they had been approved by the CNMMN prior to publication.

Following the publication of the last CNMMN list in 1982 until 1991, the IMA did not publish any further reports with respect to new mineral species. If one wanted information on new species, one had to rely on individual descriptions of such species in the literature or on the lists of new mineral species published periodically in the *Mineralogical Magazine*. Whereas such compilations were published in other journals, the Commission specifically used those lists published in the *Mineralogical Magazine* from the very beginning, starting in 1961 with list No. 22 (when Hey, then the CNMMN Vice-chairman, took over the preparation of the lists from Spencer), for disclosure of details other than the name. In these lists, the names of recognized

TABLE 1. NUMBER OF NEW MINERALS APPROVED BY IMA–CNMMN IN THE PERIOD 1959–1979

List	Date prepared	No. of new minerals	No. of voting representatives <sup>1</sup>
1959	15 March 1961	36	6
1960	6 October 1961	25	9
1961	15 July 1963	29	10
1963	12 April 1965	49	13
1964	2 September 1967	33	10–16
1965	?	41	12–18
1966	June 1968	35	13–17
1967	June 1969	48	13–19
1968	29 August 1970	38	14–20
1969	(June 1972)	37	9–20
1970	(March 1973)	39	13–20
1972	17 September 1974	38	13–22
1975	?	48	13–21
1976	?	42	16–22
1977	?	55	14–21
1978	?	64	9–22
1979	?	70	14–20

<sup>1</sup> The number of voting members varied depending on the mineral.

species are in bold, but there is no information with respect to the outcome of the voting. During this period, lists No. 32 (1982) through No. 36 (1990) were published in the *Mineralogical Magazine*, and span the editorships of Max Hey and A.M. Clark.

### *Grandfather clause*

The CNMMN continued the effort of the CNCM of “grandfathering” minerals that were well established in the literature. The “grandfather” clause was a practice by which names created before the establishment of a duly constituted nomenclature body could be adopted into officially recognized body of mineral names without having to go through the same procedures required for new names. It is interesting to note that there was significant division in the early debates within the CNCM. In its first report, 38 minerals were “grandfathered” including “water” and **Ice**. As well, the majority of the committee members wanted to standardize the names of minerals from Dana’s System by adding “ite”. None of the names from the standardized list have been adopted by the CNMMN, whereas all the Dana names have been subsequently “grandfathered” without alteration (Foshag *et al.* 1923).

Minerals to which the “grandfather” clause was to be applied were those minerals that were already well described and generally accepted. They were not resubmitted for approval and consequently did not receive an IMA number. Minerals that could not be properly discredited (where, for example, type material could not be located) were also subject to a “grandfather” clause. As a result, some minerals of dubious validity still enjoy recognized status.

Important to this effort to “grandfather” mineral names was the publication of Michael Fleischer’s *Index of new mineral names, discredited minerals and changes of mineralogical nomenclature in volumes 1–50 of The American Mineralogist* in 1966. This index was the precursor of what was to become his *Glossary of Mineral Species*, first published in 1971. Following Fleischer’s death September 5, 1998, his “Glossary” passed to CNMMN Chairman Emeritus, Joseph A. Mandarino, who modified the title to *Fleischer’s Glossary of Mineral Species*. Fleischer incorporated and presented decisions on the approval of new species and the discreditation and rejection of mineral names by the CNMMN. As Commission chairman, Fleischer contributed to many of the procedures related to mineral nomenclature put forward by the Commission.

In the introduction to the 1966 index, Fleischer referred to the early joint efforts of the American CNCM and of the Mineralogical Society (UK), to reach international agreement on mineralogical nomenclature. He gave credit to the pioneering work of the joint committee and noted that it led directly to the CNMMN. One practice he introduced in the 1966 index was the writ-

ing of valid mineral species in bold type, and all other names in regular type. This practice helped to distinguish which names had in fact been “grandfathered”.

### RECENT HISTORY

Since the creation of the CNMMN, nomenclature itself has continued to evolve as technological advances allowed scientists to make more accurate studies of minerals and mineral groups. Old mineral names have in some instances been discredited as names of individual species, *e.g.* “Biotite”, “Hornblende”, and some are in fact revalidated, *e.g.*, **Aerinite**, **Pseudorutile** (Nickel & Grice 1998).

New understanding of the chemical makeup of minerals at the atomic level has led to the use of modifiers, in some cases causing names to be changed. In particular, the Levinson modifier, proposed by Alfred Levinson in 1966 and approved by the IMA in 1971, became part of current usage after Michael Fleischer integrated it into his *Glossary of Mineral Species* in 1986. The Levinson modifier was originally meant to apply to rare-earth elements and was added to the name with a hyphen and enclosed in parentheses, *e.g.*, **Aeschnite-(Y)**, **Allanite-(Ce)**. Since then the rule has been expanded to include other elements as modifiers, again with a hyphen, no commas but with or without parentheses, *e.g.*, **Jahnsite-(CaMnMn)**, **Chabazite-Sr**, **Labuntsovite-Mn**. This rule has increased in importance as whole groups of minerals have been recently re-examined and renamed in some cases, *e.g.*, the Zeolite group, the Labuntsovite group.

The paper by Max Hey and Glaucio Gottardi in 1980 set down the CNMMN’s position with respect to other modifiers such as prefixes, suffixes and adjectival modifiers. Their article greatly restricted the use of these modifiers, but is not as stringently adhered to in the literature as it should be. In fact, the incorrect use of modifiers is one of the largest sources of objectionable mineral names entering the literature. A good example of the problem is the use of chemical modifiers with proper mineral names. The author of a recent paper cited “Zn-spinel” in the title and text, also called it “zincian spinel” in the text (Chattopadhyay 1999). The adjoining chemical formula,  $(\text{Zn}, \text{Fe}, \text{Mg})\text{Al}_2\text{O}_4$  (clearly not **Spinel**), showed that if the CNMMN rules had been properly adhered to, the first term should not have been used; the mineral should have been referred to as “ferroan magnesian **Gahnite**”. Although **Gahnite** is a zinc-dominant member of the spinel group, to call it “zincian spinel” in a paper in a mineralogical journal is imprecise and misleading.

It is now rare (but not unheard of) that a new mineral name makes it into the literature without following CNMMN procedures. Where it does occur, authors can expect to be “rapped on the knuckles” by the international mineralogical community.

## EVOLUTION TOWARD THE PRESENT PROCEDURE

When the IMA met in Copenhagen in 1960, the Council of the IMA entrusted the Commission on New Minerals and Mineral Names with three tasks. These have been the guiding principles in dealing with nomenclature issues ever since. They are: 1) Review all proposed changes in nomenclature (new names, discreditations, and changes in definitions) before publication if possible in order to avoid the publication of non-valid or undesirable names, 2) prepare an annual list of changes in nomenclature, vote on them, and publish the lists with indications of the commission's approval or disapproval, and 3) endeavor to attain international uniformity in nomenclature as far as may be practicable (Anonymous 1962a).

Although the CNMMN did publish a list of desired data and essential minimum data required for the acceptance of a new mineral in 1961 (Permingeat 1961), the first outline of a procedure for the naming of new mineral species published by the IMA, a one-page list of six points, was prepared by Michael Fleischer in 1970. Before this paper was published, the procedure for the preparation of proposals was given orally at IMA meetings, and for the first time at the first meeting of the CNMMN in 1960. The first rules and procedures of the Commission were established at that meeting (Dunn & Mandarino 1988). The 1976 procedure put an end to the publication of mineral names that were submitted to the CNMMN and subsequently disapproved. It also allowed for the referral of opaque minerals to the Commission on Ore Minerals for comments.

The 1984 *Rules of procedure of the Commission on New Minerals and Mineral Names* (Mandarino *et al.* 1984) were an update to the 1970 procedure. The number of points doubled to twelve in total. The collection of papers relating to nomenclature issues that had been published before 1987 were condensed into the *Procedures involving the IMA Commission on New Minerals and Mineral Names and guidelines on mineral nomenclature* published in various journals in 1987 by Nickel and Mandarino. In particular, their account draws from the guidelines in the naming of minerals by Schaller (1930), Levinson (1966), Donnay & Fleischer (1970), Bailey (1978), Hey & Gottardi (1980), Bailey *et al.* (1981) and Guinier *et al.* (1984). The 1987 Procedure superseded the 1984 paper and incorporated new decisions of the CNMMN in the years since Fleischer's 1970 paper. It is far more comprehensive and gives guidelines on the proper naming of minerals in greater detail.

In time for the IMA meeting in Toronto in 1998, exactly 74 years after Spencer put forward the idea of an international body to standardize the naming of minerals in the same city, Nickel & Grice (1998) published the *Procedure and Guidelines on Mineral Nomenclature*. This document superseded the report of Nickel & Mandarino (1987) and took into consideration changes in the intervening years, such as the new definition of a

mineral (Nickel 1995). At the same meeting, the host organization, the Mineralogical Association of Canada (MAC), distributed a compendium of all the major IMA papers related to the naming of minerals (Martin 1998). In its aim of promoting IMA-recognized nomenclature, the MAC had already published one book containing all IMA-recognized names, the *Encyclopedia of Mineral Names* and was preparing the publication of a second book, *The Glossary of Mineral Synonyms*, complementary to the first in providing for all unrecognized names their IMA-recognized equivalent.

The present procedures, as outlined by Nickel & Grice (1998), cover the various types of chemical substances that can be found in nature (with or without the influence of man), including minerals as defined by the CNMMN, biogenic compounds, anthropogenic and technogenic compounds, amorphous materials, polymorphs, polytypes and interstratifications. It lays out the requirements for approval once a submission is made to the CNMMN. The submission goes to the CNMMN, and normally, representatives have 60 days to vote on the proposal, each of which is given its own IMA number upon receipt. As well, procedures are included for the redefinition, discreditation or the revalidation of previously discredited minerals. On occasion, depending on the nature of the mineral, the approval process may take much longer. Guidelines for the choosing of a mineral name are given. They state that the choice of a name is largely the responsibility of the author. A name previously used in the literature may not have been in common usage for at least 50 years. Once a mineral is approved, the author is given two years to publish the new name and description of the new species.

At present, there are ten approved minerals that have not been described in a publication within the two-year time limit (Table 2). In fact, most are over three years, the longest being 10 years! The authors of the 1998 IMA procedure clearly state that descriptions "not published within that time (...) are no longer considered as approved." Proposals can remain approved if the Chairman of the CNMMN grants an extension. Although no exact numbers have been calculated of the number of

TABLE 2. CASES IN WHICH THE PUBLICATION OFFICIALLY ESTABLISHING A NEW MINERAL SPECIES HAS NOT APPEARED WITHIN THE REGULATION TWO-YEAR TIME LIMIT

92-036	(Zn,Li,Fe,Mg, $\square$ ) <sub>4</sub> Al <sub>16</sub> Si <sub>6</sub> O <sub>44</sub> (OH) <sub>4</sub>
92-038	Cu <sub>20</sub> (Fe,Cu,Zn) <sub>8</sub> Mo <sub>2</sub> Ge <sub>2</sub> S <sub>32</sub>
92-039	Cu <sub>20</sub> (Fe,Zn,Cu) <sub>8</sub> W <sub>2</sub> Ge <sub>2</sub> S <sub>32</sub>
93-046	(Rh,Ir,Pt) <sub>3</sub> S <sub>4</sub>
93-062	(Pd,Ag) <sub>3</sub> Te
95-020	CaB <sub>3</sub> O <sub>4</sub> (OH) <sub>4</sub>
97-015	(Na,Ca) <sub>2</sub> Ca(Ti,Nb) <sub>3</sub> Si <sub>12</sub> O <sub>38</sub> (OH,F) <sub>4</sub> •5H <sub>2</sub> O
98-018	(Na,Ca,Bi) <sub>3</sub> Ta <sub>2</sub> O <sub>6</sub> F
98-032	Cu <sub>16</sub> (AsO <sub>4</sub> ) <sub>4</sub> (SO <sub>4</sub> )(OH) <sub>6</sub> •8H <sub>2</sub> O
99-045	Na <sub>4</sub> (UO <sub>2</sub> )(CO <sub>3</sub> ) <sub>3</sub>

authors that have not respected the two-year time line, only a relatively small number of authors go over the time limit. As the IMA does not publish how many have not respected the time limit and have not been granted an extension, the exact number of “delinquent” mineral species, let alone who the authors are, will probably never be known. In the same way that minerals approved by the CNMMN are published with an IMA number, those authors that have broken the rule on publication and the minerals that have thereby lost their approved status should also be published with the IMA number so that any other mineralogists wishing to make a description of the mineral from a different find would not be blocked from doing so.

#### THE IMA NUMBERS

IMA numbers started to be given to new mineral submissions in 1962 when the CNMMN was under the chairmanship of the late Michael Fleischer (E.H. Nickel, pers. commun., 2002). As a general rule, IMA numbers originally were not meant to appear in publications and were purely administrative in nature. These numbers were not published until Joseph A. Mandarino, Chairman of the CNMMN from 1983 through 1994, started to make them public for the first time in 1991 in the *Mineralogical Magazine*. It was decided that it would be helpful to people working on new species to know if the species of interest had already gone through the CNMMN of the IMA. However, the Commission did not feel that it could release the names of the approved species before the descriptions had been published (J.A. Mandarino, pers. commun., 2002). The Commission had hoped that “the major mineralogical journals” would publish the lists “on a quarterly or semi-annual basis.” However, they have been published annually ever since, and it is unlikely that this practice will change (Mandarino 1991). Currently, such lists are published in *American Mineralogist*, *Canadian Mineralogist*, *European Journal of Mineralogy*, *Zapiski Vserossiiskovo Mineralogicheskovo Obshchestva* and *Mineralogical Magazine*. (Some of the aforementioned journals have not published all the lists; other journals have also published some of these lists.) Some IMA numbers from before J.A. Mandarino started publishing numbers in 1991 have appeared in print and thereby have become part of the public domain. They are reproduced here (Table 3).

Since the first published list of IMA numbers in 1991, the IMA submission numbers that have appeared in the literature are for approved minerals only. The earliest number that has made it into the literature dates from 1978. Consequently, the list compiled in Table 3 contains only the numbers that have appeared publicly with their subsequent official mineral name. Table 4 contains the chemical formula for those cases where a name has not yet been published within the stipulated two-year time limit.

The number itself consists of two parts. The first part represents the year in which the submission was received, not the year the mineral was approved. The second part is attributed according to the order in which the submission was received. This system explains numerical gaps in the list; not all submissions are approved. Since “Y2K”, the first part of the number has been expanded to four digits from the original two. As a result, some of the numbers published before the year 2000 can be found in the literature in both five and seven digit formats.

It should be noted that modifications to mineral nomenclature, such as discreditations and revalidations, employ a different numbering system. These numbers have generally not been published in the open literature (E.H. Nickel, pers. commun., 2002). Redefinitions that result in a new mineral name also bear a distinctive IMA number. These consist of the year in which the submission was made followed by a hyphen and a capital letter. So far, the only published examples of this type of number are for **Paralabuntsovite-Mg**, **Orthojoaquinite-(La)** and **Hellandite-(Ce)**, i.e., 2000–A, 2000–D, 2000–F (Chukanov *et al.* 2002, Matsubara *et al.* 2001, Oberti *et al.* 2002). A lower-case ‘a’ following the number (e.g., 93–027a) indicates that the proposal for the new mineral species was resubmitted to the Commission before being finally published (G. Ferraris, pers. commun., 2002).

#### List of published IMA numbers

As some mineralogists follow very closely minerals initially published under an IMA number only, and as some of the information issued by the CNMMN can be somewhat different when the complete mineral description is finally published, it is my view that it is useful for the authors of the description to make mention of the IMA number so that interested mineralogists can make a cross-reference of the published information. Some minerals are preliminarily described as unknowns with a reference to an IMA number (de Fourestier 1999). Some Web sites contain lists of published IMA numbers with the accordant mineral name, e.g., Mineralogy Database by David Barthelmy (<http://webmineral.com>), but these lists are incomplete and contain errors.

The CNMMN itself at present does not publish the accepted names with the concordant IMA number. Consequently, Table 3 provides a correlation between the original anonymous preliminary description, published in the IMA–CNMMN lists from 1991 to present, and the subsequent full published descriptions, which can be accessed by the name of the new mineral species listed next to the number. Other IMA numbers, published Joseph A. Mandarino, also are included, so that the list contains mineral species already described in the literature (Table 3) and those that will be described within the regulation two-year delay after approval (Table 4). These tables provide a complete and compre-

TABLE 3. PUBLISHED IMA NUMBER WITH SUBSEQUENTLY PUBLISHED APPROVED NAME OF MINERAL SPECIES

1963	70-034 = <b>Gittinsite</b>	1978
	70-035 = <b>Pellyite</b>	
63-008 = <b>Moorhouseite</b>		78-007 = <b>Donnayite-(Y)</b>
63-009 = <b>Aplowite</b>	1971	78-017 = <b>Paranatrolite</b>
		78-022 = <b>Yarrowite</b>
1964	71-014 = <b>Larosite</b>	78-023 = <b>Spionkopite</b>
	71-020 = <b>Cuprospinel</b>	78-028 = <b>Prosperite</b>
64-019 = <b>Latrappite</b>	71-028 = <b>Haycockite</b>	78-032 = <b>Keithconnite</b>
	71-037 = <b>Jamborite</b>	78-047 = <b>Gaitite</b>
1965		78-056 = <b>Nickelbischofite</b>
	1972	78-071 = <b>Sabinaite</b>
65-013 = <b>Berryite</b>		78-075 = <b>Povondraite</b>
65-029 = <b>Gaspéite</b>	72-002 = <b>Tellurantimony</b>	
	72-003 = <b>Mattagamite</b>	1979
1966	72-016 = <b>Tulameenite</b>	
	72-019 = <b>Hilairite</b>	79-019 = <b>Wicksite</b>
66-012 = <b>Mckinstryite</b>	72-026 = <b>Monteregianite-(Y)</b>	79-024 = <b>Mcgillite</b>
66-015 = <b>Madocite</b>		79-045 = <b>Tancoite</b>
66-016 = <b>Veenite</b>	1973	79-063 = <b>Petarasite</b>
66-017 = <b>Twinnite</b>		
66-018 = <b>Guettardite</b>	73-001 = <b>Jagowerite</b>	1980
66-019 = <b>Playfairite</b>	73-003 = <b>Gaidonnayite</b>	
66-020 = <b>Sterryite</b>	73-018 = <b>Temagamite</b>	80-021 = <b>Stibivanite</b>
66-021 = <b>Launayite</b>	73-032 = <b>Agrellite</b>	80-033 = <b>Spertiniite</b>
66-032 = <b>Sorbyite</b>	73-044 = <b>Caysichite-(Y)</b>	80-034 = <b>Pararealgarn</b>
	73-048 = <b>Sudburyite</b>	80-041 = <b>Doyleite</b>
1967		
	1974	1981
67-003 = <b>Nuffieldite</b>		
67-010 = <b>Tintinaite</b>	74-045 = <b>Yofortierite</b>	81-002 = <b>Nahpoite</b>
67-042 = <b>Weloganite</b>		81-006 = <b>Franconite</b>
67-043 = <b>Muskoxite</b>	1975	81-011 = <b>Sturmanite</b>
1968		
	75-012 = <b>Kulanite</b>	1982
	75-016 = <b>Cowlesite</b>	
68-011 = <b>Dadsonite</b>	75-027 = <b>Barícite</b>	82-012 = <b>Wadsleyite</b>
68-013 = <b>Lemoynite</b>	75-029 = <b>Rucklidgeite</b>	82-075 = <b>Jeffreyite</b>
68-017 = <b>Neyite</b>		82-106 = <b>Kiddcreekite</b>
68-023 = <b>Langisite</b>	1976	
68-027 = <b>Dresserite</b>		1983
	76-023 = <b>Penikisite</b>	
1969	76-024 = <b>Marićite</b>	83-002 = <b>Lapieite</b>
	76-036 = <b>Hydrodresserite</b>	83-013 = <b>Mannardite</b>
69-006 = <b>Romarchite</b>	76-057 = <b>Černýite</b>	83-019 = <b>Simonkolleite</b>
69-007 = <b>Hydroromarchite</b>	76-056 = <b>Satterlyite</b>	83-029 = <b>Lautenhalite</b>
69-012 = <b>Wakefieldite-(Y)</b>		83-065 = <b>Izoklakeite</b>
69-016 = <b>Carletonite</b>	1977	83-069 = <b>Chenite</b>
69-017 = <b>Nisbite</b>		83-088 = <b>Hochelagaite</b>
69-022 = <b>Athabascaite</b>	77-005 = <b>Strontiodresserite</b>	
69-023 = <b>Paracostibite</b>	77-026 = <b>Boyleite</b>	1984
	77-030 = <b>Gormanite</b>	
1970	77-049 = <b>Mandarinoite</b>	84-006 = <b>Ferrowodginitite</b>
		84-008 = <b>Titanowodginitite</b>
70-014 = <b>Clinosafflorite</b>		

84-024 = **Georgechaoite**  
 84-033 = **Perraultite**  
 84-035 = **Rapidcreekite**  
 84-055 = **Manganosegelerite**  
 84-072 = **Bobfergusonite**

1985

85-001 = **Montroyalite**  
 85-024 = **Watkinsonite**  
 85-025 = **Moydite-(Y)**  
 85-050 = **Thornasite**  
 85-052 = **Petrukite**  
 85-057 = **Cabriite**

1986

86-006 = **Protoferro-anthophyllite**  
 86-007 = **Protomangano-ferro-anthophyllite**  
 86-024 = **Ferrilotharmeyerite**  
 86-025 = **Mummeite**  
 86-027 = **Makovickyite**  
 86-028 = **Poudretteite**  
 86-033 = **Skippenite**  
 86-043 = **Griceite**  
 86-046 = **Potassium-fluor-richterite**  
 86-050 = **Bearthite**  
 86-051 = **Mcauslanite**  
 86-054 = **Zanazziite**

1987

87-007 = **Donharrisite**  
 87-008 = **Edoylerite**  
 87-015 = **Hemloite**  
 87-020 = **Jahnsite-(CaMnMn)**  
 87-022 = **Squawcreekite**  
 87-024 = **Stalderite**  
 87-025 = **Erniggliite**  
 87-026 = **Edenhartherite**  
 87-030 = **Wattersite**  
 87-037 = **Criddleite**  
 87-043 = **Kamphaugite-(Y)**  
 87-044 = **Maxwellite**  
 87-045 = **Wadalite**

1988

88-008 = **Arupite**  
 88-011 = **Lithiowodginite**  
 88-014 = **Leningradite**  
 88-022 = **Buckhornite**  
 88-023 = **Werdingite**  
 88-028 = **Edgarbaileyite**  
 88-029 = **Orlymanite**

88-032 = **Komkovite**  
 88-035 = **Lithiomarsturite**  
 88-037 = **Voggite**  
 88-038 = **Montesommaite**  
 88-041 = **Tuliokite**  
 88-043 = **Wawayandaite**  
 88-045 = **Geminite**  
 88-046 = **Girvasite**  
 88-051 = **Baumhauerite**  
 ["Baumhauerite-2a"]  
 88-052 = **Alluaivite**  
 88-053 = **Wilkinsonite**

1989

89-001 = **Yingjiangite**  
 89-002 = **Lishizhenite**  
 89-004 = **Vyalsovite**  
 89-006 = **Roshchinite**  
 89-007 = **Toyohaite**  
 89-008 = **Calcio-ancylite-(Nd)**  
 89-009 = **Boggsite**  
 89-010 = **Dmisteinbergite**  
 89-011 = **Jolliffeite**  
 89-013 = **Damaraite**  
 89-015 = **Rorisite**  
 89-017 = **Cheremnykhite**  
 89-018 = **Kuksite**  
 89-023 = **Mangangordonite**  
 89-024 = **Belendorffite** <sup>†</sup>  
 89-025 = **Lintisite**  
 89-026 = **Namansilite**  
 89-027 = **Boromuscovite**  
 89-028 = **Francisite**  
 89-029 = **Gillulyite**  
 89-030 = **Radtkeite**  
 89-031 = **Strontiopiemontite**  
 89-032 = **Astrocyanite-(Ce)**  
 89-033 = **Znucalite**  
 89-034 = **Lévyclaudite**  
 89-037 = **Tschernichite**  
 89-038 = **Hejtmanite**  
 89-039 = **Manganotychite**  
 89-040 = **Strontiowhitlockite**  
 89-042 = **Trimounsie-(Y)**  
 89-043 = **Yoshiokaite**  
 89-044 = **Vasilite**  
 89-045 = **Szymańskiite**  
 89-047 = **Olekminskite**  
 89-049 = **Parafransoletite**  
 89-050 = **Rouvilleite**  
 89-051 = **Sitinakite**  
 89-052 = **Kukisvumite**  
 89-053 = **Belkovite**  
 89-055 = **Arsenogorceixite**  
 89-056 = **Lunijianlaite**  
 89-057 = **Barstowite**  
 89-058 = **Coombsite**

1990

90-002 = **Pepprossiite-(Ce)**  
 90-004 = **Dissakisite-(Ce)**  
 90-005 = **Clinotobermorite**  
 90-006 = **Schwertmannite**  
 90-007 = **Abswurbachite**  
 90-008 = **Bystrite**  
 90-009 = **Tounkite**  
 90-010 = **Tooeleite**  
 90-011 = **Capgaronnite**  
 90-012 = **Pitiglianoite**  
 90-013 = **Cancrisilite**  
 90-014 = **Hydroxycancrinite**  
 90-015 = **Shomiokite-(Y)**  
 90-016 = **Paranatisite**  
 90-018 = **Saliotite**  
 90-019 = **Jianshuiite**  
 90-020 = **Gravegliaite**  
 90-021 = **Normandite**  
 90-023 = **Haynesite**  
 90-024 = **Manaksite**  
 90-025 = **Polyphite**  
 90-026 = **Quadruphite**  
 90-027 = **Tvedalite**  
 90-028 = **Silinaite**  
 90-030 = **Nalipoite**  
 90-031 = **Zenzénite**  
 90-032 = **Rimkorolgit**  
 90-033 = **Ashburtonite**  
 90-036 = **Camérolaite**  
 90-037 = **Deloryite**  
 90-040 = **Liebauite**  
 90-041 = **Orschallite**  
 90-042 = **Cianciulliite**  
 90-043 = **Clinomimetite**  
 90-044 = **Metamunirite**  
 90-045 = **Mrázekite**  
 90-046 = **Uranopolycrase**  
 90-047 = **Luberoite**  
 90-048 = **Padmaite**  
 90-049 = **Weinebeneite**  
 90-050 = **Franklinphilite**  
 90-051 = **Høgtuvaite**  
 90-052 = **Yanomamite**  
 90-054 = **Quadridavyne**  
 90-055 = **Oulankaite**  
 90-056 = **Ferrisurite**  
 90-057 = **Bellbergite**

1991

91-001 = **Deanesmithite**  
 91-003 = **Bismutocolumbite**  
 91-005 = **Guarinoite**  
 91-007 = **Reppiaite**  
 91-008 = **Walthierite**  
 91-009 = **Huangite**

91-010 = <b>Harrisonite</b>	92-018 = <b>Paraniite-(Y)</b>	93-029 = <b>Seidite-(Ce)</b>
91-012 = <b>Vistepite</b>	92-019 = <b>Ravatite</b>	93-030 = <b>Crawfordite</b>
91-013 = <b>Tiettaite</b>	92-020 = <b>Fluororichterite</b>	93-031 = <b>Artroite</b>
91-014 = <b>Ershovite</b>	92-022 = <b>Juanitaite</b>	93-032 = <b>Vanadomalayaite</b>
91-015 = <b>Megacyclite</b>	92-024 = <b>Kusachiite</b>	93-033 = <b>Fluorocannilloite</b> ¶
91-016 = <b>Mozartite</b>	92-025 = <b>Mcalpineite</b>	93-034 = <b>Gerenite-(Y)</b>
91-017 = <b>Segnitite</b>	92-026 = <b>Charmarite</b>	93-035 = <b>Olkhonskite</b>
91-018 = <b>Trembathite</b>	["Charmarite-2H"]	93-036 = <b>Effenbergerite</b>
91-019 = <b>Fetiasite</b>	92-027 = <b>Charmarite</b>	93-037 = <b>Selwynite</b>
91-020 = <b>Krasnovite</b>	["Charmarite-3T"]	93-038 = <b>Zajacite-(Ce)</b>
91-021 = <b>Swaknoite</b>	92-028 = <b>Quintinite</b> ["Quintinite-2H"]	93-040 = <b>Smrkovecrite</b>
91-022 = <b>Kosnarite</b>	92-029 = <b>Quintinite</b> ["Quintinite-3T"]	93-041 = <b>Peterbaylissite</b>
91-023 = <b>Mccrillsite</b>	92-030 = <b>Caresite</b>	93-042 = <b>Dozyite</b>
91-024 = <b>Coquandite</b>	92-031 = <b>Sazykinaite-(Y)</b>	93-044 = <b>Brizziite</b> §
91-025 = <b>Watanabeite</b>	92-032 = <b>Kornite</b>	93-058 = <b>Shkatulkalite</b>
91-026 = <b>Thérèsemagnanite</b>	92-033 = <b>Hennomartinitite</b>	93-059 = <b>Tungstibite</b>
91-027 = <b>Fluorbritholite-(Ce)</b>	92-034 = <b>Foitite</b>	93-060 = <b>Clinooatacamite</b>
91-028 = <b>Leakeite</b>	92-035 = <b>Magnesiostaurolite</b>	93-061 = <b>Owensite</b>
91-029 = <b>Bottinoite</b>	92-037 = <b>Zdenekite</b>	93-045 = <b>Mereiterite</b>
91-030 = <b>Parkinsonite</b>	92-040 = <b>Gaultite</b>	93-047 = <b>Frankhawthorneite</b>
91-031 = <b>Vonbezingeite</b>	92-041 = <b>Dorallcharite</b>	93-048 = <b>Medenbachite</b>
91-032 = <b>Bernalite</b>	92-042 = <b>Baksanite</b>	93-049 = <b>Takedaite</b>
91-033 = <b>Hunchunite</b>	92-043 = <b>Rabecite</b>	93-050 = <b>Jankovičite</b>
91-034 = <b>Fontanite</b>	92-044 = <b>Ternovite</b>	93-051 = <b>Viaeneite</b>
91-035 = <b>Mitryaevaite</b>	92-045 = <b>Kintoreite</b>	93-052 = <b>Grossite</b>
91-036 = <b>Hibbingite</b>	92-046 = <b>Rosenbergite</b>	93-053 = <b>Shannonite</b>
91-037 = <b>Borodaevite</b>	92-048 = <b>Petersenite-(Ce)</b>	93-054 = <b>Dzharkenite</b>
91-038 = <b>Lindqvistite</b>	92-050 = <b>Magnesiummortierite</b>	93-055 = <b>Altsite</b>
91-042 = <b>Tsaregorodtsevitte</b>		93-056 = <b>Hyttsjöite</b>
91-043 = <b>Stibiocolusite</b>		93-057 = <b>Menshikovite</b>
91-044 = <b>Germanocolusite</b>		
91-045 = <b>Samfowlerite</b>	1993	1994
91-046 = withdrawn*		
91-047 = <b>Fangite</b>	93-001 = <b>Calcioburbankite</b>	94-001 = <b>Yuanfuliite</b>
91-048 = <b>Mineevite-(Y)</b>	93-002 = <b>Ernieckelite</b>	94-002 = <b>Nchwaningite</b>
91-050 = <b>Vicanite-(Ce)</b>	93-003 = <b>Alarsite</b>	94-003 = <b>Crerarite</b>
91-051 = <b>Tsnigriite</b>	93-004 = <b>Alumoklyuchevskite</b>	94-004 = <b>Ungarettiite</b>
91-052 = <b>Kieffite</b>	93-005 = <b>Strakhovite</b>	94-005 = <b>Bechererite</b>
91-053 = <b>Brianyoungite</b>	93-006 = <b>Tetraroosveltite</b>	94-006 = <b>Phosphoellenbergerite</b>
91-054 = <b>Abenakiite-(Ce)</b>	93-008 = <b>Barberite</b>	94-007 = <b>Nafertisite</b>
91-055 = <b>Khrstovite-(Ce)</b>	93-009 = <b>Sphaerobismoite</b>	94-008 = <b>Lenaite</b>
	93-010 = <b>Chladniite</b>	94-010 = <b>Dusmatovite</b>
1992	93-011 = <b>Szenicsite</b>	94-011 = <b>Gwihabaite</b>
	93-012 = <b>Scandiobabingtonite</b>	94-012 = <b>Reederite-(Y)</b>
92-001 = <b>Mahlmoodite</b>	93-013 = <b>Karusugite</b>	94-013 = <b>Sabelliite</b>
92-002 = <b>Cannonite</b>	93-016 = <b>Mayingite</b>	94-014 = <b>Zlatogorite</b>
92-003 = <b>Antimonselite</b>	93-017 = <b>Gaotaite</b>	94-016 = <b>Zincöhögbomite</b>
92-005 = <b>Seelite</b>	93-018 = <b>Shuangfengite</b>	94-017 = <b>Varennesite</b>
92-006 = <b>Widgiemoolthalite</b>	93-019 = <b>Pingguite</b>	94-018 = <b>Calcioaravaipaite</b>
92-008 = <b>Qilianshanite</b>	93-020 = <b>Carlosruizite</b>	94-019 = <b>Wupatkiite</b>
92-010 = <b>Pringleite</b>	93-021 = <b>Fuenzalidaite</b>	94-020 = <b>Nežilovite</b>
92-011 = <b>Ruitenbergitte</b>	93-022 = <b>Tuzlaite</b>	94-021 = <b>Gallobeudantite</b>
92-012 = <b>Poldervaardite</b>	93-023 = <b>Vlodavetsite</b>	94-022 = <b>Fluorthalénite-(Y)</b>
92-013 = <b>Petitjeanite</b>	93-024 = <b>Wycheproofite</b>	94-023 = <b>Chengdeite</b>
92-014 = <b>Nickenichite</b>	93-025 = <b>Jentschite</b>	94-024 = <b>Orthowalpurgitte</b>
92-015 = <b>Mikasaite</b>	93-026 = <b>Fluoro-ferro-leakeite</b>	94-025 = <b>Jáchymovite</b>
92-016 = <b>Gatehouseite</b>	93-027a = <b>Telluronevskite</b>	94-026 = <b>Studenitsite</b>
92-017 = <b>Morimotoite</b>	93-028 = <b>Yuanjiangite</b>	94-030 = <b>Babkinite</b>

94-031 = **Iltisite**  
 94-032 = **Nierite**  
 94-033 = **Sigismundite**  
 94-034 = **Magnesiocoulsonite**  
 94-035 = **Mahnertite**  
 94-036 = **Hanawaltite**  
 94-038 = **Quadratite**  
 94-043 = **Jensenite**  
 94-045 = **Staněkite**  
 94-046 = **Potassicpargasite**  
 94-047 = **Sorosite**  
 94-048 = **Androsite-(Ca)**  
 94-049 = **Koragoite**  
 94-050 = **Frankamenite**  
 94-051 = **Saddlebackite**  
 94-052 = **Odintsovite**  
 94-053 = **Natroxalate**  
 94-054 = **Gottardiite**  
 94-055 = **Wesselsite**  
 94-056 = **Fettelite**  
 94-057 = **Dessauite**  
 94-058 = **Noélbensonite**  
 94-059 = **Fluoro-edenite**  
 94-096 = **Fettelite**

1995

95-001 = **Benauite**  
 95-002 = **Benyacarite**  
 95-003 = **Malanite**  
 95-005 = **Strontiomelane**  
 95-006 = **Laforêtite**  
 95-007 = **Oenite**  
 95-009 = **Sudovikovite**  
 95-011 = **Leisingite**  
 95-012 = **Yvonite**  
 95-013 = **Feinglosite**  
 95-014 = **Penobsquisite**  
 95-015 = **Ternesite**  
 95-016 = **Fianelite**  
 95-017 = **Edgarite**  
 95-018 = **Ferroccladonite**  
 95-019 = **Ferro-aluminoccladonite**  
 95-021 = **Rosiaite**  
 95-022 = **Meurigite**  
 95-023 = **Belovite-(La)**  
 95-024 = **Isolueshite**  
 95-025 = **Natroglaucocerinite**  
 95-026 = **Terranovaite**  
 95-027 = **Averievite**  
 95-028 = **Rambergite**  
 95-029 = **Clerite**  
 95-030 = **Christelite**  
 95-031 = **Vuoriyaivite**  
 95-032 = **Hexaferrum**  
 95-033 = **Intersilite**  
 95-034 = **Pyatenkoite-(Y)**

95-035 = **Niobocarbide**  
 95-036 = **Deloneite-(Ce)**  
 95-037 = **Grattarolaite**  
 95-038 = **Rodolicoite**  
 95-039 = **Utahite**  
 95-040 = **Kukharenkoite-(Ce)**  
 95-041 = **Damiaioite**  
 95-042 = **Yixunite**  
 95-043 = **Jedwabite**  
 95-044 = **Chrombismite**  
 95-045 = **Sodic-ferri-clinoferrholmquistite**  
 95-046 = **Jørgensenite**  
 95-047 = **Changchengite**  
 95-048 = **Pushcharovskite**  
 95-049 = **Tatyanaitite**  
 95-050 = **Hechtsbergite**  
 95-051 = **Tschörtnerite**  
 95-052 = **Chromphyllite**  
 95-053 = **Ancylite-(La)**

1996

96-001 = **Juabite**  
 96-002 = **Piretite**  
 96-003 = **Walfordite**  
 96-004 = **Lesukite**  
 96-005 = **Chlorartinite**  
 96-006 = **Gordaite**  
 96-007 = **Kalifersite**  
 96-008 = **Stoppaniite**  
 96-009 = **Brianroulstonite**  
 96-010 = **Graeserite**  
 96-012 = **Caosite**  
 96-013 = **Deliensite**  
 96-014a = **Scainiite**  
 96-015 = **Georgbokiite**  
 96-016 = **Nepskoeite**  
 96-017 = **Gilmarite**  
 96-018 = **Rossmannite**  
 96-019 = **Sheldrickite**  
 96-020 = **Philolithite**  
 96-022 = **Fluorcaphite**  
 96-023 = **Kentbrooksite**  
 96-024 = **Pretulite**  
 96-025 = **Mutinaite**  
 96-026 = **Kenhsuite**  
 96-027 = **Ilinskite**  
 96-028 = **Galileiite**  
 96-029 = **Boralsilite**  
 96-030 = **Rhodarsenide**  
 96-032 = **Horváthite-(Y)**  
 96-033 = **Lukechangite-(Ce)**  
 96-034 = **Raadeite**  
 96-035 = **Phosphogartrellite**  
 96-036 = **Turkestanite**  
 96-037 = **Phosphovanadylite**  
 96-038 = **Hydrowoodwardite**

96-039 = **Isovite**  
 96-040 = **Hjärneite**  
 96-041 = **Berezanskite**  
 96-043 = **Mallestigite**  
 96-044 = **Chrisstanleyite**  
 96-045 = **Mereheadite**  
 96-047 = **Ferrorhodsite**  
 96-048 = **Chloromenite**  
 96-049 = **Georgeericksenite**  
 96-050 = **Barquillite**  
 96-051 = **Parasibirskite**  
 96-052 = **Velikite**  
 96-053 = **Kuzelite**  
 96-054 = **Haggertyite**  
 96-055 = **Zugshunsite-(Ce)**  
 96-056 = **Coskrenite-(Ce)**  
 96-057 = **Levinsonite-(Y)**  
 96-058 = **Rubicline**  
 96-059 = **Bamfordite**  
 96-060 = **Juonniite**  
 96-061 = **Parascorodite**  
 96-062 = **Carmichaelite**  
 96-063 = **Natrolemoynite**  
 96-064 = **Coparsite**

1997

97-001 = **Brendelite**  
 97-002 = **Okayamalite**  
 97-003 = **Lemmlinite-K**  
 97-004 = **Cuboargyrite**  
 97-005 = **Chadwickite**  
 97-007 = **Manganonordite-(Ce)**  
 97-008 = **Ferronordite-(Ce)**  
 97-009 = **Zálesiite**  
 97-010 = **Tsugaruite**  
 97-012 = **Cabalarite**  
 97-014 = **Pseudosinhalite**  
 97-016 = **Kanonerovite**  
 97-017 = **Clinocervantite**  
 97-018 = **Shibkovite**  
 97-019 = **Zaccagnaite**  
 97-021 = **Grumiplucite**  
 97-022 = **Andyrobertsite**  
 97-023 = **Calcio-andyrobertsite**  
 97-024 = **Niedermayrite**  
 97-025 = **Blatonite**  
 97-026 = **Wiluite**  
 97-027 = **Cobaltlotharmeyerite**  
 97-028 = **Palladodymite**  
 97-029 = **Miassite**  
 97-030 = **Polkanovite**  
 97-032 = **Wallkilldellite-(Fe)**  
 97-033 = **Kastningite**  
 97-034 = **Wilhelmkleinite**  
 97-035 = **Potassic-ferrisadanagaite**  
 97-036 = **Galgenbergite**

97-037 = <b>Woolridgeite</b>	98-049 = <b>Xenotime-(Yb)</b>	99-040 = <b>Chabazite-Sr</b>
97-038 = <b>Batiferrite</b>	98-050a = <b>Labuntsovite-Mg</b>	99-041 = <b>Tumchaite</b>
97-040 = <b>Brinrobertsite</b>	98-051 = <b>Labuntsovite-Fe</b>	99-042 = <b>Felbertalite</b>
97-041 = <b>Changoite</b>	98-052a = <b>Lemmleinite-Ba</b>	99-043 = <b>Paganoite</b>
97-042 = <b>Pillaite</b>	98-054 = <b>Belloite</b>	99-046 = <b>Ferrokentbrooksite</b>
97-043 = <b>Suredaite</b>	98-055 = <b>Rengeite</b>	99-047 = <b>Pararsenolamprite</b>
97-044 = <b>Akimotoite</b>	98-056 = <b>Fluoro-magnesio- arfvedsonite</b>	99-048 = <b>Fluorannite</b>
97-045 = <b>Simmonsit</b>	98-057 = <b>Kapitsait-(Y)</b>	99-049 = <b>Baumstarkite</b>
97-047 = <b>Thomasclarkite-(Y)</b>	98-058 = <b>Kuzmenkoite</b>	99-050 = <b>Vanadiumdravite</b>
97-048 = <b>Schaferite</b>	98-059 = <b>Bismutopyrochlore</b>	99-051 = <b>Schiavinatoite</b>
97-049 = <b>Haigerachite</b>	98-060 = <b>Mozgovaite</b>	
97-050 = <b>Nabiasite</b>	98-061 = <b>Sodic-ferripedrizite</b>	2000
97-051 = <b>Sicherite</b>	98-062 = <b>Arakiite</b>	
	98-063 = <b>Kozoite-(Nd)</b>	2000-002 = <b>Bradaczekite</b>
1998	98-064 = <b>Oneillite</b>	2000-003 = <b>Kampfite</b>
	98-065 = <b>Hydroxylclinohumite</b>	2000-005 = <b>Sailaufite</b>
98-001 = <b>Rollandite</b>	98-066 = <b>Gottlobite</b>	2000-006 = <b>Dashkovaite</b>
98-002 = <b>Carraraite</b>	98-067 = <b>Urusovite</b>	2000-007 = <b>Turtmannite</b>
98-003a = <b>Bleasdaleite</b>	98-069 = <b>Ronneburgite</b>	2000-008 = <b>Lisitsynite</b>
98-004 = <b>Marumoite</b>		2000-009 = <b>Malinkoite</b>
98-006 = <b>Serrabrancaite</b>	1999	2000-012 = <b>Cobaltneustädteite</b>
98-007 = <b>Bederite</b>		2000-014 = <b>Laflammeite</b>
98-009 = <b>Vergasovaite</b>	99-002 = <b>Tegengrenite</b>	2000-015 = <b>Ferronordite-(La)</b>
98-010 = <b>Silvialite</b>	99-003 = <b>Clearcreekite</b>	2000-017 = <b>Feklichevite</b>
98-011 = <b>Gladiusite</b>	99-005 = <b>Bakhchisaraitsevite</b>	2000-018 = <b>Orthominasragite</b>
98-012 = <b>Theoparacelsite</b>	99-006 = <b>Remondite-(La)</b>	2000-021 = <b>Buryatite</b>
98-013 = <b>Khaidarkanite</b>	99-007 = <b>Švenekite</b>	2000-023 = <b>Fencooperite</b>
98-014 = <b>Zincgartrellite</b>	99-008 = <b>Nickellotharmeyerite</b>	2000-024 = <b>Nabesite</b>
98-015 = <b>Rappoldite</b>	99-009 = <b>Johntomaite</b>	2000-025 = <b>Thomsonite-Sr</b>
98-016 = <b>Neustädteite</b>	99-010 = <b>Rouaite</b>	2000-027 = <b>Matsubaraite</b>
98-017 = <b>Brandholzite</b>	99-011 = <b>Tamaite</b>	2000-029 = <b>Bobkingite</b>
98-019 = <b>Korobitsynite</b>	99-012 = <b>Cerchiarait</b>	2000-031 = <b>Organovaite-Mn</b>
98-023 = <b>Nickelphosphide</b>	99-013 = <b>Florenskyite</b>	2000-032 = <b>Cattiite</b>
98-024 = <b>Ekatite</b>	99-014 = <b>Londonite</b>	2000-033 = <b>Ganterite</b>
98-025 = <b>Esperanzaite</b>	99-015 = <b>Bigcreekite</b>	2000-034 = <b>Oswaldpeetersite</b>
98-026 = <b>Zincowoodwardite</b> [polytype 3R]	99-016 = <b>Henrymeyerite</b>	2000-035 = <b>Bussenite</b>
98-026a = <b>Zincowoodwardite</b> [polytype 17]	99-017 = <b>Litvinskite</b>	2000-036 = <b>Rinmanite</b>
98-027 = <b>Khmaralite</b>	99-018 = <b>Cronusite</b>	2000-038 = <b>Allabogdanite</b>
98-028 = <b>Ferrotitanowodginite</b>	99-019a = <b>Biehlite</b>	2000-039 = <b>Novgorodovaite</b>
98-029 = <b>Polyakovite-(Ce)</b>	99-020 = <b>Adamsite-(Y)</b>	2000-040 = <b>Manganvesuvianite</b>
98-030 = <b>Formicaite</b>	99-021 = <b>Dukeite</b>	2000-041 = <b>Ferriallanite-(Ce)</b>
98-031 = <b>Vajdakite</b>	99-022 = <b>Juanitaite</b>	2000-042 = <b>Woodallite</b>
98-033 = <b>Zincalstibite</b>	99-023 = <b>Brodtkorbite</b>	2000-045 = <b>Bobjonesite</b>
98-034 = <b>Itoigawaite</b>	99-024 = <b>Chromceladonite</b>	2000-046 = <b>Tsepinite-Na</b>
98-035 = <b>Symesite</b>	99-025 = <b>Ominellite</b>	2000-047 = <b>Dickthomssenite</b>
98-036 = <b>Sidpietersite</b>	99-026 = <b>Ferrokinothitalite</b>	2000-049 = <b>Fluoro-edenite</b>
98-037 = <b>Magnesiofoitite</b>	99-027 = <b>Schneebergite</b>	2000-050 = <b>Burnsite</b>
98-038 = <b>Orlandiite</b>	99-028 = <b>Nickelschneebergite</b>	2000-051 = <b>Kristiansenite</b>
98-039 = <b>Lulzacite</b>	99-029 = <b>Cobaltsumcorite</b>	2000-052 = <b>Santabarbaraite</b>
98-042 = <b>Khomyakovite</b>	99-030 = <b>Lukrahnite</b>	2000-A = <b>Paralabuntsovite-Mg</b>
98-043 = <b>Manganokhomyakovite</b>	99-031 = <b>Manganonaujakasite</b>	2000-D = <b>Orthojoaquinite-(La)</b>
98-044 = <b>Krettnichite</b>	99-032 = <b>Niobokupletskite</b>	2000-F = <b>Hellandite-(Ce)</b>
98-045 = <b>Moëloite</b>	99-033 = <b>Micheelsenite</b>	
98-046 = <b>Obertiite</b>	99-034 = <b>Petterdite</b>	2001
98-047 = <b>Bariosincosite</b>	99-035 = <b>Moganite</b>	
98-048 = <b>Springcreekite</b>	99-036 = <b>Ercitite</b>	2001-001 = <b>Monazite-(Sm)</b>
	99-039 = <b>Gmelinite-K</b>	2001-005 = <b>Verbeekite</b>
		2001-006 = <b>Organovaite-Zn</b>

2001-007 = <b>Parakuzmenkoite-Fe</b>	2001-027 = <b>Decrespignyite-(Y)</b>	2001-052 = <b>Cobaltarthurite</b>
2001-008 = <b>Megakalsilite</b>	2001-028 = <b>Karupmøllerite</b>	2001-053 = <b>Keilite</b>
2001-009 = <b>Gjerdingenite-Fe</b>	2001-029 = <b>Hoganite</b>	2001-054 = <b>Sewardite</b>
2001-010 = <b>Tillmannsite</b>	2001-030 = <b>Paceite</b>	2001-057 = <b>Vitimitite</b>
2001-012 = <b>Telyushenkoite</b>	2001-032 = <b>Ferripedrizite</b>	2001-059 = <b>Martinitite</b>
2001-013 = <b>Reidite</b>	2001-033 = <b>Pellouxite</b>	2001-061 = <b>Tischendorfite</b>
2001-014 = <b>Tweddillite</b>	2001-034 = <b>Gramaccioliite</b>	2001-063 = <b>Shirokshinitite</b>
2001-015 = <b>Emilite</b>	2001-035 = <b>Tedhadleyite</b>	
2001-016 = <b>Salzburgite</b>	2001-037 = <b>Kuzmenkoite-Zn</b>	2002
2001-018 = <b>Lanmuchangite</b>	2001-038 = <b>Gutkovaite-Mn</b>	
2001-020 = <b>Mottanaite-(Ce)</b>	2001-040 = <b>Orthominasragrite</b>	2002-026 = <b>Lalondeite</b>
2001-021 = <b>Ciprianiite</b>	2001-041 = <b>Bobtrallite</b>	2002-029 = <b>Manganokukisvumite</b>
2001-024 = <b>Cavoite</b>	2001-042 = <b>Cerite-(La)</b>	
2001-026 = <b>Mangan- lotharmeyerite</b>	2001-044 = <b>Greifensteinite</b>	
	2001-051 = <b>Walkerite</b>	

Notes: † “Landsbergite”, \* “Pradetite”, ‡ “Fluor-cannilloite”, § “Brizziite-III”, “Brizziite-VII”.

TABLE 4. PUBLISHED IMA NUMBER OF MINERAL SPECIES NOT YET DESCRIBED IN THE LITERATURE WITHIN TWO-YEAR TIME LIMIT SINCE APPROVAL

98-070	$\text{Pb}(\text{U}^{4+}, \text{U}^{6+})(\text{Ti}, \text{Fe}^{2+}, \text{Fe}^{3+})_{20}(\text{O}, \text{OH})_{34}$	2001-023	$(\text{Ca}, \text{K}, \text{Na}, \text{Sr}, \text{Ba})_{44}[(\text{Ti}, \text{Nb}, \text{Fe}, \text{Mn})_{12}(\text{OH})_{12}]$
99-037	$\text{NaCaCu}_2(\text{AsO}_4)_2\text{Cl} \cdot 5\text{H}_2\text{O}$		$\text{Si}_{10}\text{O}_{14}[\text{F}, \text{OH}, \text{Cl}]_4$
2000-001	$\text{Cu}_2\text{Fe}^{3+}(\text{AsO}_4)_2[\text{As}^{3+}\text{O}_2(\text{OH})_2] \cdot \text{H}_2\text{O}$	2001-031	$\text{Pb}_2\text{Al}(\text{PO}_4)(\text{VO}_3)(\text{OH})$
2000-004	$\text{Bi}(\text{OH})\text{SO}_4 \cdot \text{H}_2\text{O}$	2001-036	$(\text{K}, \text{Na})\text{Ca}_2(\text{Mg}, \text{Fe}^{2+})_2\text{Al}(\text{Si}_6\text{Al}_2\text{O}_{22})(\text{Cl}, \text{OH})_2$
2000-010	$(\text{Na}, \text{H}_3\text{O})_{12}(\text{Ca}, \text{Mn}, \text{REFe})_2\text{Fe}^{3+}\text{Zr}_3(\square, \text{Zr})(\square, \text{Si})\text{Si}_{24}\text{O}_{66}$	2001-039	$\text{NaFe}^{2+}_6\text{Al}_3(\text{SO}_4)_2(\text{OH})_{18}(\text{H}_2\text{O})_{12}$
	$(\text{O}, \text{OH})_2\text{Cl} \cdot 2\text{-}3\text{H}_2\text{O}$	2001-041	$\text{Na}_{15}\text{Sr}_{12}\text{Zr}_4\text{Si}_2\text{B}_2\text{O}_{138}(\text{OH})_6 \cdot 12\text{H}_2\text{O}$
2000-011	$\text{KCaCu}_2(\text{AsO}_4)_2[\text{As}(\text{OH})_2\text{O}_2]_2 \cdot \text{H}_2\text{O}$	2001-043	$\text{Na}_2\text{KMn}_2\text{Li}_2\text{V}_2\text{Si}_4\text{O}_{24}$
2000-013	$\text{Li}_{1+3x}\text{Al}_x(\text{BSi}_3\text{O}_{10})(\text{OH})_2$ , $0 < x < 0.33$	2001-045	$\text{KMn}_2(\text{AlSi}_2)_2\text{O}_{16}(\text{OH}, \text{F})_2$
2000-016	$(\text{Ti}, \text{Fe}, \text{Mg}, \text{Mn})_{1+8}\text{Ti}_2\text{O}_5$	2001-048	$(\text{Fe}, \text{Mg}, \text{Zn}, \text{Al})_6\text{Al}_4(\text{Ti}, \text{Fe})_2\text{O}_{30}(\text{OH})_2$
2000-019	$\text{Cu}_2(\text{UO}_2)_2(\text{SO}_4)_2(\text{OH})_{16} \cdot 14\text{H}_2\text{O}$	2001-049	$\text{KNa}_2\text{Mg}_2\text{Fe}^{3+}_2\text{LiSi}_4\text{O}_{22}(\text{OH})_2$
2000-020	$\text{Fe}_2[\text{AsO}_4\text{OH}][\text{AsO}_4(\text{OH})_2] \cdot 2\text{H}_2\text{O}$	2001-050	$(\text{Ca}, \text{REE})_2(\text{Al}, \text{Mg}, \text{Fe})_2[\text{Si}_2\text{O}_7][\text{SiO}_4]_3(\text{O}, \text{F}, \text{OH})_3$
2000-022	$\text{Ca}_2\text{Mn}^{2+}\text{Fe}^{3+}\text{Si}_4\text{O}_{18}(\text{OH})(\text{H}_2\text{O})_2$	2001-055	$\text{CaSrAl}_3(\text{Si}_2\text{O}_7)(\text{SiO}_3)(\text{OH})$
2000-026	$(\text{Mn}, \text{Li})_4(\text{Ta}, \text{Sn})_4(\text{Ta}, \text{Nb})_2\text{O}_{32}$	2001-056	$(\text{Mg}_2(\text{H}_2\text{O})_{23}(\text{UO}_2)_7(\text{SO}_4)_4(\text{OH})_2$
2000-028	$\text{Na}_{27}\text{K}_9\text{Ca}_{12}\text{Fe}_2\text{Zr}_2\text{Si}_{12}\text{O}_{144}(\text{O}, \text{OH}, \text{H}_2\text{O})_6\text{Cl}_2$	2001-058	$\text{Ca}(\text{Cu}_{0.76}\square_{0.30})(\text{Cd}_{1.64}\text{Ca}_{0.32})_{22.00}\text{Al}_3(\text{PO}_4)_4\text{F}_3(\text{H}_2\text{O})_{10}(\text{H}_2\text{O}, \text{F})_2$
2000-030	$\text{CaMg}_2(\text{Al}, \text{Mg})(\text{Si}_2\text{O}_7)_2(\text{BO}_3)_2(\text{OH})_2(\text{OH})$	2001-060	$\square(\text{Na}, \text{Ba})[\text{Na}_3\text{Ti}(\text{Ti}_2\text{O}_7\text{Si}_2\text{O}_4)(\text{OH}, \text{F})_2]$
2000-037	$\text{Ca}_2(\text{Al}, \text{Mg})_2(\text{SiO}_4)_2(\text{Si}_2\text{O}_7)_2(\text{F}, \text{OH})_{10}$	2001-062	$(\text{UO}_2)_2\text{Bi}(\text{PO}_4)_2 \cdot 2\text{H}_2\text{O}$
2000-044	$\text{Pb}_{1/2}\text{Cu}_{1/2}\text{Bi}_{1/2}\text{S}_{12}$	2001-064	$\text{NaMg}_2(\text{Si}_2\text{AlO}_{10})(\text{OH}, \text{O})_2 \cdot \text{H}_2\text{O}$
2001-002	$\text{Cu}_{17}\text{Bi}_{17}\text{S}_{35}$	2001-065	$(\text{Mg}, \text{Fe})_2\text{Si}_4\text{O}_{22}(\text{OH})_2$
2001-004	$\text{CaCu}_2[\text{PO}_4]_2(\text{PO}_4\text{OH})(\text{OH})_2 \cdot 3\text{H}_2\text{O}$	2001-066	$\square\text{Li}_2(\text{Fe}^{2+}_2\text{Fe}^{3+})\text{Si}_6\text{O}_{22}(\text{OH})_2$
2001-017	$\text{Cu}_{3.4}\text{Fe}_{0.4}\text{Bi}_2\text{S}_{10}$	2001-067	$\square\text{Li}_2(\text{Fe}^{2+}, \text{Mg})\text{Si}_4\text{O}_{22}(\text{OH})_2$
2001-019	$[\text{Ca}_3(\text{REE})_3]_2(\text{REE})_2\text{Al}\square_2[\text{Si}_4\text{B}_4\text{O}_{22}](\text{OH}, \text{F})_2$	2001-068	$\text{NaLi}_3(\text{Fe}^{3+}_2\text{Fe}^{2+}_2\text{Li})\text{Si}_4\text{O}_{22}(\text{OH})_2$
2001-022	$\text{Pb}_2\text{Fe}^{3+}(\text{VO}_4)_2(\text{OH})$	2001-070	$\text{Ca}_3(\text{PO}_4)_3$

hensive list of all IMA numbers that have made it into the literature to date (Mandarino 1997, 2001).

Furthermore, the basic information provided in the lists published by the CNMMN is not always the same as that in the full published descriptions. I believe that all new descriptions in the literature should include the respective IMA number so that interested parties can compare the announcements of new mineral species with what is eventually published about them. In at least one instance, a mineral was announced as approved in the IMA–CNMMN lists only to be withdrawn. Without the list published here, the public record would be incomplete in this regard. I emphasize that the list pub-

lished here contains only IMA numbers that have been published, to which the general public has access, and not all minerals approved by the CNMMN.

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