

**CENTER FOR DRUG EVALUATION AND  
RESEARCH**

*APPLICATION NUMBER:*

**202429Orig1s000**

**PROPRIETARY NAME REVIEW(S)**

**Department of Health and Human Services**  
**Public Health Service**  
**Food and Drug Administration**  
**Center for Drug Evaluation and Research**  
**Office of Surveillance and Epidemiology**  
**Office of Medication Error Prevention and Risk Management**

Date: June 2, 2011

Application Type/Number: NDA 202429

Through: Melina Griffis RPh, Team Leader  
Todd Bridges, RPh, Acting Deputy Director  
Carol Holquist, RPh, Director  
Division of Medication Error Prevention and Analysis (DMEPA)

From: Lubna Merchant MS, Pharm.D, Safety Evaluator  
Division of Medication Error Prevention and Analysis

Subject: Proprietary Name Review

Drug Name & Strength: Zelboraf (Vemurafenib) Tablets, 240 mg

Applicant: Hoffmann-La Roche Inc.

OSE RCM #: 2011-1375

**\*\*\* This document contains proprietary and confidential information that should not be released to the public.\*\*\***

## CONTENTS

EXECUTIVE SUMMARY .....	3
1 BACKGROUND.....	3
1.1 Introduction.....	3
1.2 Product Information .....	3
2 METHODS AND MATERIALS .....	3
2.1 Search Criteria.....	3
2.2 Prescription Analysis Studies.....	4
3 RESULTS.....	4
3.1 Data base and Information Sources.....	4
3.2 Expert Panel Discussion.....	4
3.3 Prescription Analysis Studies.....	5
3.4 Safety Evaluator Risk Assessment .....	5
3.5 Comments from the Division of Drug Oncology Products.....	5
4 DISCUSSION .....	5
4.1 Promotional Assessment .....	5
4.2 Safety Assessment.....	5
5 CONCLUSIONS AND RECOMMENDATIONS .....	6
5.1 Comments to the Applicant.....	6
6 REFERENCES .....	7
APPENDICES .....	8

## **EXECUTIVE SUMMARY**

This review summarizes DMEPA's evaluation of Zelboraf as the proposed proprietary name for Vemurafenib Tablets. Our evaluation did not identify concerns that would render the name unacceptable based on the product characteristics and safety profile known at the time of this review. Thus, DMEPA finds the proposed proprietary name Zelboraf acceptable for this product. The proposed proprietary name must be re-reviewed 90 days before approval of the NDA. DMEPA will notify the Applicant of these findings via letter

Additionally, if any of the proposed product characteristics as stated in this review are altered, DMEPA rescinds this finding and the name must be resubmitted for review. The conclusions upon re-review are subject to change.

## **1 BACKGROUND**

### **1.1 INTRODUCTION**

This review responds to a request from Hoffmann-La Roche Inc. dated April 28, 2011 for a promotional and safety assessment of the proposed proprietary name, Zelboraf.

### **1.2 PRODUCT INFORMATION**

Zelboraf (Vemurafenib) is indicated for the treatment of patients with BRAF<sup>V600</sup> mutation-positive unresectable or metastatic melanoma. The recommended dose of Zelboraf will be 960 mg (4 tablets) taken twice daily. Zelboraf will be available in a single strength of 240 mg tablets, packaged in bottles containing 120 tablets.

## **2 METHODS AND MATERIALS**

Appendix A describes the general methods and materials used by the Division of Medication Error Prevention and Analysis (DMEPA) when conducting a proprietary name risk assessment for all proprietary names. Sections 2.1 and 2.2 identify specific information associated with the methodology for the proposed proprietary name, Zelboraf.

### **2.1 SEARCH CRITERIA**

For this review, particular consideration was given to drug names beginning with the letter 'Z' when searching to identify potentially similar drug names, as 75% of the confused drug names reported by the USP-ISMP Medication Error Reporting Program involve pairs beginning with the same letter.<sup>1,2</sup>

To identify drug names that may look similar to Zelboraf, the DMEPA safety evaluators also considers the orthographic appearance of the name on lined and unlined orders.

---

<sup>1</sup> Institute for Safe Medication Practices. Confused Drug name List (1996-2006). Available at <http://www.ismp.org/Tools/confuseddrugnames.pdf>

<sup>2</sup> Kondrack, G and Dorr, B. <sup>3</sup> National Coordinating Council for Medication Error Reporting and Prevention. <http://www.nccmerp.org/aboutMedErrors.html>. Last accessed 10/11/2007.

Specific attributes taken into consideration include the length of the name (eight letters), upstrokes (four, capital letter ‘Z’ lower case ‘b’, ‘l’, and ‘f’), down strokes (one, lower case ‘f’), cross strokes (one, lower case ‘f’), and dotted letters (none). Additionally, several letters in Zelboraf may be vulnerable to ambiguity when scripted (See Appendix B). As a result, the DMEPA staff also considers these alternate appearances when identifying drug names that may look similar to Zelboraf.

When searching to identify potential names that may sound similar to Zelboraf, the DMEPA staff search for names with similar number of syllables (three), stresses (Zel-bo-raf), and placement of vowel and consonant sounds. (See Appendix B). The Applicant’s intended pronunciation (ZEL-bor-raf) was also taken into consideration, as it was included in the Proprietary Name Review Request. Moreover, names are often mispronounced and/or spoken with regional accents and dialects, so other potential pronunciations of the name are considered.

## **2.2 PRESCRIPTION ANALYSIS STUDIES**

In order to evaluate the potential for misinterpretation of the proposed proprietary name in handwriting and verbal communication of the name, the following inpatient medication order, outpatient and verbal prescription was communicated during the FDA prescription studies. (See Appendix C for samples and results).

## **3 RESULTS**

The following sections describe the findings from our database searches, expert panel discussion, prescription analysis studies and safety evaluator risk assessment.

### **3.1 DATA BASE AND INFORMATION SOURCES**

The DMEPA safety evaluator searches yielded a total of twenty three names as having some similarity to the name Zelboraf.

Twenty two of the names were thought to look like Zelboraf. These include: Zoladex, Caldecort, Zelapar, Zelnorm, Zebutal, Caderol, Xiaflex, Zaltrap\*\*\*, Zoloft, Zorbtive, Gabitril, Lithonate, Melfiat, Mellaril, Letrozole, Safyral, Felbamate, Sildenafil, Zinacef, Selferma, Velosef, and Voltaren. One name was thought to look and sound similar to Zelboraf: Zelboraf.

Additionally, DMEPA staff did not identify any United States Adopted Names (USAN) stems in the proposed proprietary name, as of May 4, 2011.

### **3.2 EXPERT PANEL DISCUSSION**

The Expert Panel reviewed the pool of names identified by DMEPA staff (See Section 3.1 above) and noted no additional names thought to have orthographic or phonetic similarity to Zelboraf.

DDMAC had no concerns regarding the proposed name from a promotional perspective, and did not offer any additional comments relating to the proposed name.

### **3.3 PRESCRIPTION ANALYSIS STUDIES**

A total of 46 practitioners responded to the prescription analyses studies. In the written prescription study, 5 of the participants interpreted the scripted name sample correctly in both samples. However, for practitioners interpreting the written prescription for Zelboraf incorrectly, none of the responses overlapped with an existing drug product name. In the verbal studies, one of the participants interpreted the name correctly. See Appendix C for the complete listing of interpretations from the verbal and written prescription studies.

### **3.4 SAFETY EVALUATOR SEARCHES**

Independent searches by the primary Safety Evaluator identified four additional names which were thought to look or sound similar to Zelboraf and represent a potential source of drug name confusion. These names include: Zithranol, (b) (4) (b) (4) and (b) (4)

Thus, we identified a total of 27 names: 4 identified by the safety evaluator and 23 identified in section 3.1 above.

### **3.5 COMMENTS FROM THE DIVISION OF DRUG ONCOLOGY PRODUCTS (DDOP)**

#### ***3.5.1 Initial Phase of Review***

In response to the OSE, May 5, 2011 e-mail, DDOP did not forward any concerns on the proposed name at the initial phase of the name review.

#### ***3.5.2 Midpoint of Review***

DMEPA notified the DDOP via e-mail that we had no concerns with the proposed proprietary name, Zelboraf, on May 26, 2011. Per e-mail correspondence from the DDOP on June 2, 2011, they indicated the Division had no other issues with the proposed proprietary name, Zelboraf and had no additional comments.

## **4 DISCUSSION**

This proposed name was evaluated from a safety and promotional perspective based on the product characteristics provided by the Applicant. We sought input from pertinent disciplines involved with the review of this application and considered their comments accordingly.

### **4.1 PROMOTIONAL ASSESSMENT**

DDMAC had no concerns regarding the proposed name from a promotional perspective, and did not offer any additional comments relating to the proposed name. DMEPA, and DDOP concurred with the findings of DDMAC's promotional assessment of the proposed name.

### **4.2 SAFETY ASSESSMENT**

DMEPA evaluated 27 names for their potential similarity to the proposed name, Zelboraf. We did not identify any other aspects of the name that would be considered as a potential source for error.

Twelve of the 27 potentially similar names did not undergo failure mode and effect analysis (FMEA) for the reasons listed in Appendix D.

Failure mode and effects analysis (FMEA) was applied to determine if the proposed proprietary name could potentially be confused with the remaining 15 names and lead to medication errors. This analysis determined that the name similarity between Zelboraf and all of the identified names was unlikely to result in medication error for the reasons presented in Appendices E.

## **5 CONCLUSIONS AND RECOMMENDATIONS**

The Proprietary Name Risk Assessment findings indicate that the proposed name, Zelboraf, is not vulnerable to name confusion that could lead to medication errors, nor is it considered promotional. Thus, the Division of Medication Error Prevention and Analysis (DMEPA) has no objection to the proprietary name, Zelboraf, for this product at this time.

If any of the proposed product characteristics as stated in this review are altered, DMEPA rescinds this finding and the name must be resubmitted for review. The conclusions upon re-review are subject to change. The Applicant will be notified of this determination via letter from DMEPA.

### **5.1 COMMENTS TO THE APPLICANT**

We have completed our review of the proposed proprietary name, Zelboraf, and have concluded that the name is acceptable.

The proposed proprietary name must be re-reviewed 90 days before approval of the NDA. If we find the name unacceptable following the re-review, we will notify you.

If any of the proposed product characteristics as stated in this review are altered, DMEPA rescinds this finding and the name must be resubmitted for review. The conclusions upon re-review are subject to change.

## 6 REFERENCES

1. ***Micromedex Integrated Index*** (<http://csi.micromedex.com>)

Micromedex contains a variety of databases covering pharmacology, therapeutics, toxicology and diagnostics.

2. ***Phonetic and Orthographic Computer Analysis (POCA)***

POCA is a database which was created for the Division of Medication Error Prevention and Analysis, FDA. As part of the name similarity assessment, proposed names are evaluated via a phonetic/orthographic algorithm. The proposed proprietary name is converted into its phonemic representation before it runs through the phonetic algorithm. Likewise, an orthographic algorithm exists which operates in a similar fashion.

3. ***Drug Facts and Comparisons, online version, St. Louis, MO***  
(<http://factsandcomparisons.com> )

Drug Facts and Comparisons is a compendium organized by therapeutic course; it contains monographs on prescription and OTC drugs, with charts comparing similar products.

4. ***FDA Document Archiving, Reporting & Regulatory Tracking System [DARRTS]***

DARRTS is a government database used to organize Applicant and Applicant submissions as well as to store and organize assignments, reviews, and communications from the review divisions.

5. ***Division of Medication Errors Prevention and Analysis proprietary name consultation requests***

This is a list of proposed and pending names that is generated by the Division of Medication Error Prevention and Analysis from the Access database/tracking system.

6. ***Drugs@FDA*** (<http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm>)

Drugs@FDA contains most of the drug products approved since 1939. The majority of labels, approval letters, reviews, and other information are available for drug products approved from 1998 to the present. Drugs@FDA contains official information about FDA approved brand name, generic drugs, therapeutic biological products, prescription and over-the-counter human drugs and discontinued drugs and “Chemical Type 6” approvals.

7. ***Electronic online version of the FDA Orange Book***  
(<http://www.fda.gov/cder/ob/default.htm>)

The FDA Orange Book provides a compilation of approved drug products with therapeutic equivalence evaluations.

8. ***U.S. Patent and Trademark Office*** (<http://www.uspto.gov>)

USPTO provides information regarding patent and trademarks.

**9. Clinical Pharmacology Online ([www.clinicalpharmacology-ip.com](http://www.clinicalpharmacology-ip.com))**

Clinical Pharmacology contains full monographs for the most common drugs in clinical use, plus mini monographs covering investigational, less common, combination, nutraceutical and nutritional products. It also provides a keyword search engine.

**10. Data provided by Thomson & Thomson's SAEGIS™ Online Service, available at ([www.thomson-thomson.com](http://www.thomson-thomson.com))**

The Pharma In-Use Search database contains over 400,000 unique pharmaceutical trademarks and trade names that are used in about 50 countries worldwide. The data is provided under license by IMS HEALTH.

**11. Natural Medicines Comprehensive Databases ([www.naturaldatabase.com](http://www.naturaldatabase.com))**

Natural Medicines contains up-to-date clinical data on the natural medicines, herbal medicines, and dietary supplements used in the western world.

**12. Stat!Ref ([www.statref.com](http://www.statref.com))**

Stat!Ref contains full-text information from approximately 30 texts; it includes tables and references. Among the database titles are: Handbook of Adverse Drug Interactions, Rudolphs Pediatrics, Basic Clinical Pharmacology, and Dictionary of Medical Acronyms Abbreviations.

**13. USAN Stems (<http://www.ama-assn.org/ama/pub/about-ama/our-people/coalitions-consortiums/united-states-adopted-names-council/naming-guidelines/approved-stems.shtml>)**

USAN Stems List contains all the recognized USAN stems.

**14. Red Book Pharmacy's Fundamental Reference**

Red Book contains prices and product information for prescription, over-the-counter drugs, medical devices, and accessories.

**15. Lexi-Comp ([www.lexi.com](http://www.lexi.com))**

Lexi-Comp is a web-based searchable version of the Drug Information Handbook.

**16. Medical Abbreviations Book**

Medical Abbreviations Book contains commonly used medical abbreviations and their definitions.

## **APPENDICES**

### **Appendix A:**

FDA's Proprietary Name Risk Assessment considers the potential for confusion between the proposed proprietary name and the proprietary and established names of drug products existing in the marketplace and those pending IND, NDA, BLA, and ANDA products currently under review by the Center. DMEPA defines a medication error as any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer.<sup>3</sup>

For the proposed proprietary name, DMEPA staff search a standard set of databases and information sources to identify names with orthographic and phonetic similarity and hold a Center for Drug Evaluation and Research (CDER) Expert Panel discussion to gather professional opinions on the safety of the proposed proprietary name. DMEPA staff also conducts internal CDER prescription analysis studies. When provided, DMEPA considers external prescription analysis study results and incorporate into the overall risk assessment.

The Safety Evaluator assigned to the Proprietary Name Risk Assessment is responsible for considering the collective findings, and provides an overall risk assessment of the proposed proprietary name. DMEPA bases the overall risk assessment on the findings of a Failure Mode and Effects Analysis (FMEA) of the proprietary name, and focuses on the avoidance of medication errors.

FMEA is a systematic tool for evaluating a process and identifying where and how it might fail.<sup>4</sup> DMEPA uses FMEA to analyze whether the drug names identified with orthographic or phonetic similarity to the proposed proprietary name could cause confusion that subsequently leads to medication errors in the clinical setting. DMEPA uses the clinical expertise of its staff to anticipate the conditions of the clinical setting where the product is likely to be used based on the characteristics of the proposed product.

In addition, the product characteristics provide the context for the verbal and written communication of the drug names and can interact with the orthographic and phonetic attributes of the names to increase the risk of confusion when there is overlap or, in some instances, decrease the risk of confusion by helping to differentiate the products through dissimilarity. Accordingly, the DMEPA staff considers the product characteristics associated with the proposed drug throughout the risk assessment because the product characteristics of the proposed may provide a context for communication of the drug name and ultimately determine the use of the product in the *usual* clinical practice setting.

Typical product characteristics considered when identifying drug names that could potentially be confused with the proposed proprietary name include, but are not limited to; established name of the proposed product, proposed indication of use, dosage form, route of administration, strength, unit of measure, dosage units, recommended dose, typical quantity or volume, frequency of administration, product packaging, storage conditions, patient population, and prescriber population. Because drug name confusion can occur at any point in the medication use process, DMEPA staff considers the potential for confusion throughout the entire U.S. medication use process, including drug procurement, prescribing and ordering, dispensing, administration, and monitoring the impact of the medication.<sup>5</sup> DMEPA provides the product characteristics considered for this review in section one.

The Division of Medication Error Prevention and Analysis considers the spelling of the name, pronunciation of the name when spoken, and appearance of the name when scripted. DMEPA also compares the spelling of the proposed proprietary name with the proprietary and established name of existing and proposed drug products because similarly spelled names may have greater likelihood to sound similar to one another when spoken or look similar to one another when scripted. DMEPA staff also examines the orthographic appearance of the proposed name using a number of different handwriting samples. Handwritten communication of drug names has a long-standing association with drug name confusion. Handwriting can cause similarly and even dissimilarly spelled drug name

---

<sup>4</sup> Institute for Healthcare Improvement (IHI). Failure Modes and Effects Analysis. Boston. IHI:2004.

<sup>5</sup> Institute of Medicine. Preventing Medication Errors. The National Academies Press: Washington DC. 2006.

pairs to appear very similar to one another. The similar appearance of drug names when scripted has led to medication errors. The DMEPA staff applies expertise gained from root-cause analysis of such medication errors to identify sources of ambiguity within the name that could be introduced when scripting (e.g., “T” may look like “F,” lower case ‘a’ looks like a lower case ‘u,’ etc). Additionally, other orthographic attributes that determine the overall appearance of the drug name when scripted (see Table 1 below for details). In addition, the DMEPA staff compares the pronunciation of the proposed proprietary name with the pronunciation of other drug names because verbal communication of medication names is common in clinical settings. If provided, DMEPA will consider the Applicant’s intended pronunciation of the proprietary name. However, DMEPA also considers a variety of pronunciations that could occur in the English language because the Applicant has little control over how the name will be spoken in clinical practice.

**Table 1.** Criteria used to identify drug names that look- or sound-similar to a proposed proprietary name.

Type of similarity	Considerations when searching the databases		
	Potential causes of drug name similarity	Attributes examined to identify similar drug names	Potential Effects
Look-alike	Similar spelling	Identical prefix Identical infix Identical suffix Length of the name Overlapping product characteristics	<ul style="list-style-type: none"> <li>Names may appear similar in print or electronic media and lead to drug name confusion in printed or electronic communication</li> <li>Names may look similar when scripted and lead to drug name confusion in written communication</li> </ul>
	Orthographic similarity	Similar spelling Length of the name Upstrokes Down strokes Cross-strokes Dotted letters Ambiguity introduced by scripting letters Overlapping product characteristics	<ul style="list-style-type: none"> <li>Names may look similar when scripted, and lead to drug name confusion in written communication</li> </ul>
Sound-alike	Phonetic similarity	Identical prefix Identical infix Identical suffix Number of syllables Stresses Placement of vowel sounds Placement of consonant sounds Overlapping product characteristics	<ul style="list-style-type: none"> <li>Names may sound similar when pronounced and lead to drug name confusion in verbal communication</li> </ul>

Lastly, the DMEPA staff also considers the potential for the proposed proprietary name to inadvertently function as a source of error for reasons other than name confusion. Post-marketing experience has demonstrated that proprietary names (or components of the proprietary name) can be a source of error in a variety of ways. Consequently, DMEPA considers and evaluates these broader safety implications of the name throughout this assessment and the medication error staff

provides additional comments related to the safety of the proposed proprietary name or product based on professional experience with medication errors.

### **1. Database and Information Sources**

DMEPA staff conducts searches of the internet, several standard published drug product reference texts, and FDA databases to identify existing and proposed drug names that may sound-alike or look-alike to the proposed proprietary name using the criteria outlined in Section 2.1. Section 6 provides a standard description of the databases used in the searches. To complement the process, the DMEPA staff use a computerized method of identifying phonetic and orthographic similarity between medication names. The program, Phonetic and Orthographic Computer Analysis (POCA), uses complex algorithms to select a list of names from a database that have some similarity (phonetic, orthographic, or both) to the trademark being evaluated. Lastly, the DMEPA staff review the USAN stem list to determine if any USAN stems are present within the proprietary name. The individual findings of multiple safety evaluators are pooled and presented to the CDER Expert Panel.

### **2. CDER Expert Panel Discussion**

DMEPA conducts an Expert Panel Discussion to gather CDER professional opinions on the safety of the proposed product and the proposed proprietary name. The Expert Panel is composed of Division of Medication Errors Prevention (DMEPA) staff and representatives from the Division of Drug Marketing, Advertising, and Communications (DDMAC). The Expert Panel also discusses potential concerns regarding drug marketing and promotion related to the proposed names.

The primary Safety Evaluator presents the pooled results of the DMEPA staff to the Expert Panel for consideration. Based on the clinical and professional experiences of the Expert Panel members, the Panel may recommend the addition of names, additional searches by the primary Safety Evaluator to supplement the pooled results, or general advice to consider when reviewing the proposed proprietary name.

### **3. FDA Prescription Analysis Studies**

Three separate studies are conducted within the Centers of the FDA for the proposed proprietary name to determine the degree of confusion of the proposed proprietary name with marketed U.S. drug names (proprietary and established) due to similarity in visual appearance with handwritten prescriptions or verbal pronunciation of the drug name. The studies employ healthcare professionals (pharmacists, physicians, and nurses), and attempts to simulate the prescription ordering process. The primary Safety Evaluator uses the results to identify orthographic or phonetic vulnerability of the proposed name to be misinterpreted by healthcare practitioners.

In order to evaluate the potential for misinterpretation of the proposed proprietary name in handwriting and verbal communication of the name, inpatient medication orders and/or outpatient prescriptions are written, each consisting of a combination of marketed and unapproved drug products, including the proposed name. These orders are optically scanned and one prescription is delivered to a random sample of the 123 participating health professionals via e-mail. In addition, a verbal prescription is recorded on voice mail. The voice mail messages are then sent to a random sample of the participating health professionals for their interpretations and review. After receiving either the written or verbal prescription orders, the participants send their interpretations of the orders via e-mail to DMEPA.

#### 4. Comments from the OND review Division or Generic drugs

DMEPA requests the Office of New Drugs (OND) or Office of Generic Drugs (OGD) Regulatory Division responsible for the application for their comments or concerns with the proposed proprietary name and any clinical issues that may impact the DMEPA review during the initial phase of the name review. Additionally, when applicable, at the same time DMEPA requests concurrence/non-concurrence with DDMAC's decision on the name. The primary Safety Evaluator addresses any comments or concerns in the safety evaluator's assessment.

The OND or OGD Regulatory Division is contacted a second time following our analysis of the proposed proprietary name. At this point, DMEPA conveys their decision to accept or reject the name. The OND or OGD Regulatory Division is requested to concur/not concur with DMEPA's final decision.

#### 5. Safety Evaluator Risk Assessment of the Proposed Proprietary Name

The primary Safety Evaluator applies his/her individual expertise gained from evaluating medication errors reported to FDA, conducts a Failure Mode and Effects Analysis, and provides an overall risk assessment of name confusion. Failure Mode and Effects Analysis (FMEA) is a systematic tool for evaluating a process and identifying where and how it might fail.<sup>6</sup> When applying FMEA to assess the risk of a proposed proprietary name, DMEPA seeks to evaluate the potential for a proposed proprietary name to be confused with another drug name because of name confusion and, thereby, cause errors to occur in the medication use system. FMEA capitalizes on the predictable and preventable nature of medication errors associated with drug name confusion. FMEA allows the Agency to identify the potential for medication errors due to orthographically or phonetically similar drug names prior to approval, where actions to overcome these issues are easier and more effective than remedies available in the post-approval phase.

In order to perform an FMEA of the proposed name, the primary Safety Evaluator must analyze the use of the product at all points in the medication use system. Because the proposed product is has not been marketed, the primary Safety Evaluator anticipates the use of the product in the usual practice settings by considering the clinical and product characteristics listed in Section one. The Safety Evaluator then analyzes the proposed proprietary name in the context of the usual practice setting and works to identify potential failure modes and the effects associated with the failure modes.

In the initial stage of the Risk Assessment, the Safety Evaluator compares the proposed proprietary name to all of the names gathered from the above searches, Expert Panel Discussion, and prescription studies, external studies, and identifies potential failure modes by asking:

***“Is the proposed proprietary name convincingly similar to another drug name, which may cause practitioners to become confused at any point in the usual practice setting?”***

An affirmative answer indicates a failure mode and represents a potential for the proposed proprietary name to be confused with another proprietary or established drug name because of look- or sound-alike similarity. If the answer to the question is no, the Safety Evaluator is not convinced that the names possess similarity that would cause confusion at any point in the medication use system, thus the name is eliminated from further review.

In the second stage of the Risk Assessment, the primary Safety Evaluator evaluates all potential failure modes to determine the likely *effect* of the drug name confusion, by asking:

---

<sup>6</sup> Institute for Healthcare Improvement (IHI). Failure Mode and Effects Analysis. Boston. IHI:2004.

***“Could the confusion of the drug names conceivably result in medication errors in the usual practice setting?”***

The answer to this question is a central component of the Safety Evaluator’s overall risk assessment of the proprietary name. If the Safety Evaluator determines through FMEA that the name similarity would not ultimately be a source of medication errors in the usual practice setting, the primary Safety Evaluator eliminates the name from further analysis. However, if the Safety Evaluator determines through FMEA that the name similarity could ultimately cause medication errors in the usual practice setting, the Safety Evaluator will then recommend the use of an alternate proprietary name.

DMEPA will object to the use of proposed proprietary name when the primary Safety Evaluator identifies one or more of the following conditions in the Risk Assessment:

- a. DDMAC finds the proposed proprietary name misleading from a promotional perspective, and the Review Division concurs with DDMAC’s findings. The Federal Food, Drug, and Cosmetic Act provides that labeling or advertising can misbrand a product if misleading representations are made or suggested by statement, word, design, device, or any combination thereof, whether through a PROPRIETARY name or otherwise [21 U.S.C 321(n); See also 21 U.S.C. 352(a) & (n)].
- b. DMEPA identifies that the proposed proprietary name is misleading because of similarity in spelling or pronunciation to another proprietary or established name of a different drug or ingredient [CFR 201.10.(C)(5)].
- c. FMEA identifies the potential for confusion between the proposed proprietary name and other proprietary or established drug name(s), and demonstrates that medication errors are likely to result from the drug name confusion under the conditions of usual clinical practice.
- d. The proposed proprietary name contains an USAN (United States Adopted Names) stem.
- e. DMEPA identifies a potential source of medication error within the proposed proprietary name. For example, the proprietary name may be misleading or, inadvertently, introduce ambiguity and confusion that leads to errors. Such errors may not necessarily involve confusion between the proposed drug and another drug product.

If DMEPA objects to a proposed proprietary name on the basis that drug name confusion could lead to medication errors, the primary Safety Evaluator uses the FMEA process to identify strategies to reduce the risk of medication errors. DMEPA is likely to recommend that the Applicant select an alternative proprietary name and submit the alternate name to the Agency for DMEPA to review. However, in rare instances FMEA may identify plausible strategies that could reduce the risk of medication error of the currently proposed name. In that instance, DMEPA may be able to provide the Applicant with recommendations that reduce or eliminate the potential for error and, thereby, would render the proposed name acceptable.

In the event that DMEPA objects to the use of the proposed proprietary name, based upon the potential for confusion with another proposed (but not yet approved) proprietary name, DMEPA will provide a contingency objection based on the date of approval. Whichever product, the Agency approves first has the right to use the proprietary name, while DMEPA will recommend that the second product to reach approval seek an alternative name.

The threshold set for objection to the proposed proprietary name may seem low to the Applicant. However, the safety concerns set forth in criteria a through e are supported either by FDA regulation or by external healthcare authorities, including the Institute of Medicine (IOM), World Health Organization (WHO), the Joint Commission, and the Institute for Safe Medication Practices (ISMP). These organizations have examined medication errors resulting from look- or

sound-alike drug names and called for regulatory authorities to address the issue prior to approval. Additionally, DMEPA contends that the threshold set for the Proprietary Name Risk Assessment is reasonable because proprietary drug name confusion is a predictable and a preventable source of medication error that, in many instances, the Agency and/or Applicant can identify and rectify prior to approval to avoid patient harm.

Furthermore, post-marketing experience has demonstrated that medication errors resulting from drug name confusion are notoriously difficult to rectify post-approval. Educational and other post-approval efforts are low-leverage strategies that have had limited effectiveness at alleviating medication errors involving drug name confusion. Applicants have undertaken higher-leverage strategies, such as drug name changes, in the past but at great financial cost to the Applicant and at the expense of the public welfare, not to mention the Agency's credibility as the authority responsible for approving the error-prone proprietary name. Moreover, even after Applicants' have changed a product's proprietary name in the post-approval phase, it is difficult to eradicate the original proprietary name from practitioners' vocabulary, and as a result, the Agency has continued to receive reports of drug name confusion long after a name change in some instances. Therefore, DMEPA believes that post-approval efforts at reducing name confusion errors should be reserved for those cases in which the potential for name confusion could not be predicted prior to approval. . (See Section 4 for limitations of the process).

If DMEPA objects to a proposed proprietary name on the basis that drug name confusion could lead to medication errors, the primary Safety Evaluator uses the FMEA process to identify strategies to reduce the risk of medication errors. DMEPA is likely to recommend that the Applicant select an alternative proprietary name and submit the alternate name to the Agency for DMEPA to review. However, in rare instances FMEA may identify plausible strategies that could reduce the risk of medication error of the currently proposed name. In that instance, DMEPA may be able to provide the Applicant with recommendations that reduce or eliminate the potential for error and, thereby, would render the proposed name acceptable.

In the event that DMEPA objects to the use of the proposed proprietary name, based upon the potential for confusion with another proposed (but not yet approved) proprietary name, DMEPA will provide a contingency objection based on the date of approval. Whichever product, the Agency approves first has the right to use the proprietary name, while DMEPA will recommend that the second product to reach approval seek an alternative name.

**Appendix B:** Letters with possible orthographic or phonetic misinterpretation

Letters in Name, Zelboraf	Scripted may appear as	Spoken may be interpreted as
Upper case 'Z'	G, f, y, c, l	S, x, c
Lower case 'e'	Any vowel	Any vowel
Lower case 'l'	b, t,	
Lower case 'b'	l, t, h	p
Lower case 'o'	Any vowel	Any vowel
Lower case 'r'	n, s, e	
Lower case 'a'	Any vowel	Any vowel
Lower case 'f'	Y, p, t	pf

**Appendix C:** FDA Prescription Study for Zelboraf

**Figure 1. Zelboraf Study Samples (conducted on May 20 , 2011)**

HANDWRITTEN REQUISITION MEDICATION ORDER	VERBAL PRESCRIPTION
<p><u>Medication Order</u></p> <p><u>Zelboraf 960 mg po BID</u></p> <hr/> <p><u>Outpatient Rx</u></p> <p>Zelboraf</p> <p>4 tabs po BID</p> <p>#240</p> <hr/>	<p>Zelboraf Take 4 tablets by mouth twice daily. Dispense 240</p>

**Table 1: Responses to Prescription Study**

<b>INPATIENT</b>	<b>VOICE</b>	<b>OUTPATIENT</b>
ULTROVAB	ZELBARAS	CELBORUB
ULTURAB	ZELBERAF	TELBORAB
ZELBORAB	ZELBERAF	TELBORUB
ZELBORAF	ZELBERAS	TELBORUF
ZELBORAF	ZELBERASE	TELBURUB
ZELBORAF	ZELBERATH	ZELBORAB
ZELBORAF	ZELBERATH	ZELBORAB
ZELBORAH	ZELBORAF	ZELBORAB
ZELBORAH	ZELBORATH	ZELBORAB
ZELBORAH	ZELBRAS	ZELBORAB
ZELBORAH	ZELNORAF	ZELBORAF
ZELBORAH	ZELPERAS	ZELBORAUB
ZELBRAAF	ZELVORAT	ZELBORUB
ZELTORAB		ZELBORUB
ZELTORAH		ZELBORUF
ZELTROAB		ZELBORUF
		ZELBURUB

**Appendix D:** Proprietary names not likely to be confused or not used in usual practice settings for the reasons described.

Proprietary Name	Active Ingredient	Noted Similarity to Zelboraf	Failure preventions
(b) (4)		Look	The NDA was withdrawn by the Applicant in 2008.
Lithonate	Lithium Carbonate	Look	Name discontinued. Other proprietary names or established names are used for this product. Preliminary usage data indicates that this name is rarely used in prescribing.
Zelboraf***	Vemurafenib	Look and Sound	Identified as the trademark associated with this product or NDA.
Melfiat	Phendimetrazine Tartrate	Look	Name discontinued. Other proprietary names or established names are used for this product. Preliminary usage data indicates that this name is rarely used in prescribing.
Selferma	Fluoxetine	Look	Name discontinued. Other proprietary names or established names are used for this product. Preliminary usage data indicates that this name is not used in prescribing.
Zoloft	Sertaline	Look	Lacks sufficient orthographic similarity to result in name confusion.
Calderol	Calcifidiol	Look	Discontinued product with no available generics.
Zelnorm	Tegaserod	Look	Discontinued product with no available generics.
Zinacef	Cefuroxime	Look	Lacks sufficient orthographic similarity to result in name confusion.
Velosef	Cephradine	Look	Discontinued product with no available generics.
(b) (4)		Look	This NDA was issued a Not Approvable status in 2007.
(b) (4)	Oxybutynin	Look	This NDA was approved with the name Gelnique.

**Appendix E:** Risk of name confusion minimized by preventions listed. (Potential contributing causes highlighted by *italics*)

Product name with potential for confusion	Similarity to Proposed Proprietary Name	Strength	Usual Dose (if applicable)	Failure Mode of name confusion prevented by stated product characteristics and/or orthographic differences as described.
Zelboraf (Vemurafenib) Tablets		Single strength 240 mg	960 mg (4 tablets) given orally twice daily	
Zoladex (Goserelin) Subcutaneous Implant	Look	3.6 mg 10.8 mg	3.6 mg implanted every 28 days or 10.8 mg implanted every 12 weeks.	<p><b>Orthographic difference:</b> The position of the third upstroke is different in the two names and there is an additional upstroke at the end of the name Zelboraf giving the names different shapes.</p> <p><b>Dose:</b> 960 mg (4 tablets) vs. 3.6 mg or 10.8 mg.</p> <p><b>Strength:</b> Single (240 mg) vs. multiple (3.6 mg and 10.8 mg). The numbers do not overlap.</p> <p><b>Frequency of use:</b> Twice daily vs. every 28 days or every 12 weeks.</p> <p><b>Dosage form and route of administration:</b> Oral tablets vs. subcutaneous implant</p>
Caldecort (Hydrocortisone) Topical Cream	Look	<i>Single strength</i> 1 %	One application to affected areas <i>two to four times daily</i>	<p><b>Dose:</b> 960 mg (4 tablets) vs. one application</p> <p><b>Dosage form and route of administration:</b> Oral tablets vs. Topical gel</p> <p><b>Regulatory status:</b> Prescription vs. over the counter</p>
Zelapar (Selegiline) Orally Disintegrating <i>Tablets</i>	Look	1.25 mg 2.5 mg	One tablet taken orally once daily	<p><b>Orthographic difference:</b> There are two additional upstrokes in Zelboraf which is absent in Zelapar giving the names different shapes.</p> <p><b>Dose:</b> 960 mg (4 tablets) vs. 1.25 mg or 2.5 mg</p> <p><b>Strength:</b> Single (240 mg) vs. multiple (1.25 mg and 2.5 mg). The numbers do not overlap.</p> <p><b>Frequency of use:</b> Twice daily vs. once daily.</p>

Product name with potential for confusion	Similarity to Proposed Proprietary Name	Strength	Usual Dose (if applicable)	Failure Mode of name confusion prevented by stated product characteristics and/or orthographic differences as described.
Zelboraf (Vemurafenib) Tablets		Single strength 240 mg	960 mg (4 tablets) given orally twice daily	
Zebutal (Butalbital, Acetaminophen, and Caffeine) Capsules	Look	Single strength 50 mg-500 mg- 40 mg per capsule	One to two capsules every 4 hours as needed	<b>Orthographic difference:</b> The position of the third upstroke is different in the two names giving the names different shapes. <b>Dose:</b> 960 mg (4 tablets) vs. one to two capsules <b>Frequency of use:</b> Twice daily vs. every 4 hours as needed.
Xiaflex (Collagenase) Powder for Injection	Look	Single strength 0.9 mg	Intralesional: Inject 0.58 mg per cord affecting a metacarpophalangeal (MP) joint or a proximal interphalangeal (PIP) joint.	<b>Orthographic difference:</b> Zelboraf has an upstroke 'f' at then end of the name which is absent in Xiaflex. <b>Dose:</b> 960 mg (4 tablets) vs. 0.58 mg. <b>Frequency of use:</b> Twice daily vs. once. <b>Dosage form and route of administration:</b> Oral tablets vs. intralesional powder for injection
(b) (4)				
Zorbtive (Somatropin) Powder for Injection	Look	Single strength 8.8 mg	0.1 mg/kg given subcutaneously once daily for 4 weeks	<b>Orthographic difference:</b> Zelboraf has an upstroke 'f' at then end of the name which is absent in Zorbtive. <b>Dose:</b> 960 mg (4 tablets) vs. 0.1 mg/kg (average dose is 7 mg). <b>Frequency of use:</b> Twice daily vs. once daily <b>Dosage form and route of administration:</b> Oral tablets vs. powder for injection given subcutaneous

Product name with potential for confusion	Similarity to Proposed Proprietary Name	Strength	Usual Dose (if applicable)	Failure Mode of name confusion prevented by stated product characteristics and/or orthographic differences as described.
Zelboraf (Vemurafenib) Tablets		Single strength 240 mg	960 mg (4 tablets) given orally twice daily	
Gabitril (Tiagabine) Tablets	Look	2 mg 4 mg 12 mg 16 mg	Dose ranges from 4 mg to 56 mg given <i>orally</i> one to four times daily	<b>Dose:</b> 960 mg (4 tablets) vs. 4 mg or 56 mg. <b>Strength:</b> Single (240 mg) vs. multiple (2 mg, 4 mg, 12 mg, and 16 mg). The numbers do not overlap.
Letrozole Tablets	Look	Single strength 2.5 mg	One tablet <i>by mouth</i> once daily.	<b>Orthographic difference:</b> Zelboraf has an additional upstroke 'b' in the name which is absent in Letrozole. <b>Dose:</b> 960 mg (4 tablets) vs. 2.5 mg (one tablet). <b>Frequency of use:</b> Twice daily vs. once daily.
Zithranol (Anthralin) Topical cream	Look	Single strength 1.2 %	One application applied topically to affected areas once daily	<b>Dose:</b> 960 mg (4 tablets) vs. one application. <b>Frequency of use:</b> Twice daily vs. once daily. <b>Dosage form and route of administration:</b> Oral tablets vs. topical cream
Sildenafil Tablets and Injection Solution	Look	Tablets: 20 mg 25 mg 50 mg 100 mg  Injection Solution: 0.8 mg/mL	Erectile dysfunction: <i>Oral:</i> 25 to 100 mg once 1 hour before sexual activity  Pulmonary arterial hypertension: Intravenous.: 10 mg 3 times daily Oral: 20 mg 3 times/day, taken 4-6 hours apart	<b>Orthographic difference:</b> Sildenafil (10 letters) appears longer than Zelboraf (8 letters) when scripted and has an additional upstroke in the name. <b>Dose:</b> 960 mg (4 tablets) vs. 10 mg to 100 mg. <b>Frequency of use:</b> Twice daily vs. once or three times daily.
Safyral (Ethinyl Estradiol, Drospirenone, and Levomefolate) Tablets	Look	Single strength 0.03 mg-3 mg-0.451 mg per tablet	One tablet taken <i>orally</i> once daily	<b>Orthographic difference:</b> Safyral has a downstroke 'y' in the name which is absent in Zelboraf giving the two names different shapes. <b>Dose:</b> 960 mg (4 tablets) vs. one tablet. <b>Frequency of use:</b> Twice daily vs. once daily.

Product name with potential for confusion	Similarity to Proposed Proprietary Name	Strength	Usual Dose (if applicable)	Failure Mode of name confusion prevented by stated product characteristics and/or orthographic differences as described.
Zelboraf (Vemurafenib) Tablets		Single strength 240 mg	960 mg (4 tablets) given orally twice daily	
Mellaril (Thioridazine) Tablets	Look	10 mg 25 mg 50 mg 100 mg	25 mg to 200 mg taken <i>orally</i> two to four times daily prn	<b>Dose:</b> 960 mg (4 tablets) vs. 25 mg or 200 mg. <b>Strength:</b> Single (240 mg) vs. multiple (10 mg, 25 mg, 50 mg, and 100 mg). The numbers do not overlap.
Felbamate Tablets	Look	400 mg 600 mg	1200 mg to 2400 mg three to four times daily	<b>Dose:</b> 960 mg (4 tablets) vs. 1200 mg to 2400 mg. <b>Frequency of use:</b> Twice daily vs. three to four times daily. <b>Strength:</b> Single (240 mg) vs. multiple (400 mg and 600 mg). The numbers do not overlap.
Voltaren (Diclofenac) Tablets, Ophthalmic Solution and Topical Gel	Look	Tablets: 25 mg 50 mg 75 mg 100 mg  Ophthalmic Drops: 0.01%  Topical Gel: 1 %	<i>Oral Tablet:</i> 25 mg to 100 mg one to four times daily  <i>Ophthalmic drops:</i> one a	<b>Orthographic difference:</b> Zelboraf has an upstroke 'f' at then end of the name which is absent in Voltaren. <b>Dose:</b> 960 mg (4 tablets) vs. 25 mg to 100 mg. <b>Strength:</b> Single (240 mg) vs. multiple (25 mg, 50 mg, 75 mg, 100 mg, 0.01% and 0.1%). The numbers do not overlap.

-----  
**This is a representation of an electronic record that was signed electronically and this page is the manifestation of the electronic signature.**  
-----

/s/  
-----

LUBNA A MERCHANT  
06/02/2011

TODD D BRIDGES  
06/02/2011

CAROL A HOLQUIST  
06/02/2011