



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON D.C., 20460

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OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

**MEMORANDUM**

**SUBJECT:** Response to Comments submitted to Docket No. EPA-HQ-OPP-2006-0955,  
Proposed Risk Mitigation Decision for Nine Rodenticides.

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**TO:** Laura Parsons  
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**Peer Review Panel Date:** August 22, 2007

On January 17, 2007 the Environmental Protection Agency announced the Proposed Risk Mitigation Decision for nine rodenticides. The nine rodenticides covered by this decision are brodifacoum, bromadiolone, difethialone, chlorophacinone, diphacinone, warfarin, zinc phosphide, bromethalin, and cholecalciferol. During the public comment period, which ended May 18, 2007, the Agency solicited comments on the proposed decision. This document provides the Biological and Economic Analysis Division's (BEAD) response to the public

comments submitted to the Agency by numerous stakeholders, including the Rodenticide Registrants Task Force (RRTF) and Reckitt Benckiser. This document also addresses the analysis by Heiden Associates entitled “Economic Assessment of EPA Proposed Rodenticide Risk Mitigation Decision,” which was submitted by Reckitt Benckiser as a response to EPA’s memorandum “Impact Assessment for Proposed Rodenticide Mitigation.” The Special Review and Reregistration Division (SRRD) will combine these comments with those from other divisions within the Office of Pesticide Programs (OPP) for a complete response to the public comments.

### **1. Comment:**

*RRTF Comments:* “EPA has substantially underestimated the cost of products compliant with the proposed criteria.”

“EPA has significantly underestimated the cost of bait stations meeting the proposed requirements”

*Reckitt Benckiser Comment:* “If the per placement costs of rodenticide baits increases by 500-1500% as estimated, then lower income households will choose to buy snap traps and lower income households will experience a greater impact by the money wasted on ineffective methods and the longer time needed to control their infestation.

*Bell Labs Comment:* “The unintended outcome of the proposed mitigation will [greatly] increase the cost, by as much as ten fold [the cost associated with residential rodent control], [which is] largely attributable to the tamper-resistant bait station requirement.”

“By limiting the amount of bait, due to the requirement of having and bait stations packaged together, the cost would be excessive and control measures prohibitive based on the daily food consumption of rats and the amount of bait per station.”

*Farnam Comment:* “It has been estimated that the cost of the new bait stations containing rodent bait will increase the cost of a rodenticide application by consumers approximately ten times higher than the cost today.”

*Liphatech Comments:* “Liphatech believes that the proposed measures would significantly increase the cost of rodent control to consumers, reducing their ability to obtain protection from the harmful effects of rodent infestation.”

“EPA’s analysis greatly underestimates the costs associated with tamper-resistant bait stations, because they [failed] to consult with the stakeholders on this issue. In addition, it will be impossible to determine the cost of these stations until EPA establishes the testing criteria that will be used to determine “tamper-resistance” – the generic characteristics listed in the Proposed Decision do not provide the necessary information.”

*Neogen Comment:* “EPA’s proposal would require that rodenticides only be available to consumer if they are packaged and sold along with ‘tamper-resistant’ bait stations. These new bait stations will increase the cost of rodenticide use dramatically.”

### **Response:**

- EPA’s estimates of the cost of products used in the control of rodents were based on the best public information currently available. There are a number of factors that could be included in the calculation of the cost, and EPA acknowledged that the calculation may

not account for the all costs. Further, EPA acknowledged the wide margin of variability for the costs borne by household consumers based on the uncertainty of an individual household's actual response to a rodent infestation. EPA identified some differences between our analysis and the analysis provided by Heiden Associates. These differences include the data sources that were used to estimate the number of households that experience rodent problems, the assumptions of retail prices, the assumptions used to estimate incremental costs, and estimating aggregated costs on a national level.

- ***Differences in the Data Sources for the Number of Households***

Although EPA agrees with the Heiden Analysis on the percentage of households that use rodenticides out of the total households that experience rodent problems, the Heiden Analysis estimate of the number of households that experience rodent problems are much greater than EPA's estimate. EPA estimates the number of households that experience rodent control problems annually to be approximately 7 percent whereas the Heiden Associates Analysis estimates approximately 17 percent. EPA used the 2003 AHS information as the basis for the estimate in the Impact Assessment. (U.S. Census Bureau, 2004), while the Heiden Associates Analysis combines information from an industry-sponsored market research study from TNS (the TNS Consumer Insights Attitudes and Usage study), Current Population Survey, and the 2005 American Housing Survey (AHS) as a basis for the estimate in their analysis. The AHS reports signs of rodent infestations over the last three months with a sample of over 50,000 interviews. The TNS study estimates rodent infestations over the past year with a sample of 5,000 households that were screened for the study. The time frame of the study and the sample size are two main factors for the differences in the estimates. EPA is unable to verify the data provided in the TNS study because it is not publicly available data and the commenter did not provide this study. According to the more recent 2005 AHS report, rodents were found in 7.3 million occupied housing units (6.7 percent of the U. S. total) (U.S. Census Bureau, 2006). EPA believes that data from the U.S. Census Bureau are the best publicly available data and the more appropriate data for the analysis.

Sources:

U.S. Census Bureau, 2004. Current Housing Reports, Series H150/03, *American Housing Survey for the United States: 2003* U.S. Government Printing Office, Washington, DC, 20401 Printed in 2004

U.S. Census Bureau, 2006. Current Housing Reports, Series H150/05, *American Housing Survey for the United States: 2005* U.S. Government Printing Office, Washington, DC, 20401 Printed in 2006

- ***Differences in Assumption of Retail Prices***

Reckitt Benckiser submitted an analysis by Heiden Associates entitled "Economic Assessment of EPA Proposed Rodenticide Risk Mitigation Decision" as a direct response

to EPA’s memorandum “Impact Assessment for Proposed Rodenticide Mitigation.” This analysis addresses costs and economic impacts issues pertaining to EPA’s proposed mitigation. The estimates of retail prices for new bait stations and bait packaging, however, are much higher in the Heiden Associates Analysis than EPA’s estimate. The differences in the prices are shown in table 1.

**TABLE 1. DIFFERENCES IN RETAIL PRICES OF BAIT STATIONS AND BAIT FROM EPA’S ANALYSIS AND THE HEIDEN ASSOCIATES ANALYSIS**

	<b>EPA’s Average Retail Estimate</b>	<b>Heiden Associates Retail Estimate</b>	<b>Difference in Price</b>
Mouse Bait Station	\$2.50	\$13.02	\$11.48
Rat Bait Station	\$11.71	\$33.41	\$21.70
Bait (per oz.)	\$0.60	\$4.25	\$3.65

EPA estimates are based on visits to local retail outlets (see EPA’s Impact Assessment for Proposed Rodenticide Mitigation (9/2006))

The Heiden Associates analysis price estimates include: added regulatory, research & development, and scientific service costs to obtain registration of the newly-developed alternatives for existing consumer use products, refiguring retail shelf space, larger cartons and cases for packaging, marketing and consumer education costs, direct costs and retailer margins. EPA acknowledges that there are a number of factors that could be included in the calculation of the price, and that the EPA’s estimate may not account for the all costs, however, EPA does not agree with the Heiden Analysis retail pricing estimate of new bait stations using first generation anticoagulants. EPA believes that the bait station technology proposed in the mitigation exists or needs minor modifications, therefore the Heiden Analysis research and development costs appear to be too large for this circumstance. Although a proportion of the increase cost of moving to bait stations may be passed on to consumers, it is difficult to estimate its magnitude.

- ***Differences in Incremental Costs***

The estimates of incremental costs are much higher in the Heiden Associates Analysis than EPA’s estimate. EPA believes this is due to the different assumptions about the efficacy of all considered rodent control options. The Heiden Associates analysis assumes that first generation anticoagulant baits will be ineffective 85% of the time, but second generation anticoagulants, non-anticoagulants, snap traps, glue traps and PCOs will be effective 100% of the time. This assumption increases the incremental costs in two ways: 1) Households choosing to use bait stations will need to select another rodent control option (in addition to using a bait station) because the first generation bait is not effective. This amounts to an increase in the incremental costs, and 2) The current costs for bait users (using second generation baits) are substantially lower because they do not have to select an additional rodent control option, thus widening the gap between current control costs and projected control costs. EPA does not agree with these assumptions. EPA believes that, except where there are pockets of resistance to them, warfarin and other first-generation anticoagulant rodenticides generally are expected to perform as

well as second-generation anticoagulant baits in most use situations. See, also, response to comment 2.

- ***Estimating Aggregated Costs on a National Level***

EPA reiterates that the Agency does not expect the proposed mitigations on rodent control to impose constraints on rodent control programs and activities. EPA is aware of the increased costs to consumers of rodenticides due to the proposed mitigations; however, EPA disagrees with the magnitude of the aggregated national level impacts presented in the Heiden Associates analysis. Effective rodent control includes a combination of integrated pest management strategies employing sanitation, traps, and chemical tools. EPA concurs with the Heiden Associates analysis that only a portion, or approximately 30%, of homeowners utilize rodenticides while other consumers implement other rodent control options. Based on EPA's percentage of households with rodent problems and assuming EPA's high end range of incremental costs combined with assuming that all current rodenticide users will purchase the mitigated bait stations provides EPA with a conservative high end estimate of aggregated incremental costs on a national level. This assumption presumes that in one year to control 1 to 2 mice or rats, the consumer would purchase 4 bait stations plus 4 bait refills without reusing the bait stations. EPA believes that using these conservative assumptions, aggregated national consumer incremental costs would still be considerably lower than the estimate presented in the Heiden Associates analysis.

- We sampled local and internet-based sources to collect the cost of bait stations and presented our results as a range of costs. There are various factors that could be included in the calculation of the cost of the proposed criteria. The Agency acknowledged that its analysis may not account for all the costs.

## **2. Comment:**

*RRTF Comments:* “[T]he EPA analysis of benefits incorrectly and improperly assumes both explicitly and implicitly that all rodenticides are equally effective, even though EPA has access to ample evidence demonstrating this is not true.” (p. 14)

“EPA improperly assumes that all rodenticides are equally efficacious.” (p. 38)

“EPA additionally explicitly predicates its cost analysis on the erroneous and unsupported assumption that ‘the replacement of second generation anticoagulants with first generation anticoagulants will not significantly affect the homeowners’ capability to control commensal rodents.’” (p. 40)

*Reckitt Benckiser Comment:* “EPA’s Proposed Risk Mitigation Decision creates a public health problem for all populations as it effectively prohibits rodenticide manufacturers from using second generation active ingredients, leaving consumers with only less efficacious first generation active ingredients or active ingredients for which there is no antidote, such as acute rodenticide products (e.g., bromethalin).” (p. 17)

*Bell Labs Comments:* [The Proposed Mitigation] will force homeowners to use less effective rodenticides which [will] need to be used over a longer period of time.

“By restricting the use of second-generation anticoagulants, the farmer will simply be forced into using higher quantities of less effective bait, and other alternatives, which may cause rodent populations to soar.”

*Farnam Comment:* “EPA [assumes] that other available rodenticide products are equally effective which is not true since first generation anticoagulants require multiple feeding feedings over several days and resistance to warfarin and other first-generation anticoagulants is widespread, which triggered the development of the second-generation anticoagulants in the first place.”

*Zinc Phosphide Consortium Comment:* “There is ample evidence that over-reliance on an active ingredient has led to resistance in rodent populations and reduce efficacy. Simply restricting the availability of one active ingredient will not guarantee safe and effective use of another.”

*Liphatech Comments:* “EPA clearly states that the older, first generation anticoagulant rodenticides are not as effective. (pg.3)”

“Liphatech believes that the proposed measures would make consumer rodent control efforts less effective, leading to an increase in rodent bites, property damage and disease transmission.”

*Woodstream Comment:* “While traps and devices are useful for extremely small populations, second-generation anticoagulant rodenticides provide much more effective rodent control.”

### **Response:**

- All bait products registered to control commensal rodents in the U.S. have been tested according to similar procedures and evaluated against similar criteria. Regardless of the active ingredient involved, rodenticide baits registered for controlling commensal rodents in the U.S. have killed at least 90% of test-group subjects in laboratory efficacy trials with Norway rats and house mice, or accepted laboratory strains of those species. The only exceptions would be certain bait blocks that are claimed only for use in wet or damp areas or the odd product that was registered in the years before efficacy criteria were established and has not yet been tested pursuant to product reregistration activities. For bait blocks limited to use in wet or damp areas, the criterion of 80% mortality applies to laboratory tests. For multiple-feeding compounds (chiefly anticoagulants), bait acceptance criteria also apply. For dry baits and unweathered bait blocks, the acceptance criterion is 33%, meaning that the test bait is not rejected in favor of EPA’s standard rat-and-mouse challenge diet by a ratio greater than 2:1. For weathered baits, the acceptance criterion is 25% (i.e., rejection at no greater than a 3:1 ratio).
- While a particular rodenticide bait may be more effective in a particular situation, based on the testing described above, the Agency believes that all products stand a good chance of being effective under typical conditions of use and can compete for rodents’ attention with established, and often plentiful, alternate sources of food.
- How well a particular rodenticide product will work in a given situation depends not only on the toxicity and mode of action of the active ingredient, but also on numerous other factors, such as bait form and palatability, to what extent the toxicant is retained in the animal, how many feedings are required to cause death, how and where the bait is placed, rodent population pressure, and the presence or absence of competing food sources.

- Except where there are pockets of resistance to them, warfarin and other first-generation anticoagulant rodenticides generally are expected to perform as well as second-generation anticoagulant baits in most use situations.
- In addition to their effectiveness against rodents resistant to first-generation anticoagulants, some bait containing second-generation anticoagulants or bromethalin have been touted as single-feeding poisons. However, that expression is misleading. Although rodents that are exposed to a bait containing a second-generation anticoagulant may consume enough poison in one 24-hour period to result in their eventual deaths, the animals typically will feed and behave normally for several days and take 4 days to more than a week to die. The efficacy trial required to substantiate a “single-night’s feeding” claim requires 24 hours of exposure to a choice between the bait and challenge diet, after which time the bait is removed and the animals are maintained on challenge diet and observed for an additional length of time, usually 12 days. Death from exposure to both the first and second generation anticoagulant baits, generally take 3 to 10 days or more from onset of feeding.
- The replacement of second generation anticoagulants with first generation anticoagulants is expected to result in homeowners still being able to acquire and use rodenticide products that effectively control commensal rodents. At the same time, the potential for adverse incidents resulting from such use is reduced because applications are to be made only in tamper-resistant bait stations. In addition to the rodenticide bait products available to them, consumers will continue to have multiple options for rodent control, including purchasing bait stations, snap traps, and glue traps; contracting with a pest control firm; and, where feasible, requesting assistance from their municipal government.

### **3. Comment:**

*RRTF Comments:* “[T]he EPA analysis significantly overstates the value and practicality and viability of pesticidal alternatives like snap traps and glue boards.” (p. 14)

“EPA also incorrectly assumes that chemical and non-chemical rodent control methods are equally effective. Thus, EPA wrongly concludes that a snap trap is equivalent to a glue trap, and both are equivalent to any of the nine rodenticides that are the subject of EPA’s Proposal.” (p. 41) “...There is no rational or factual basis for EPA to equate these distinctly different rodent control measures...” Traps have limitations that make them not equivalent or adequate substitutes for rodenticide products. (pp. 45-46)

*Reckitt Benckiser Comment:* “Mechanical traps and glue traps vary greatly in their effectiveness and utility...Corrigan (1998) also concluded that snap and glue traps present severe limitations on rodent control...” (p. 20)

*Farnam Comment:* “Furthermore, we believe that the EPA significantly overstates the value of alternatives to rodenticides such as snap traps and glue boards. Snap traps and glues control only one rodent at a time and many consider them inhumane to use.

*Liphatech Comments:* “[EPA] fails to [assign any cost] to the potential health effects [resulting] from [the use of] alternative rodent control methods. Data from the Consumer Product Safety

Commission show[s] nearly 600 visits to emergency rooms each year for injuries sustained from the use of snap traps and glue traps, and from bites suffered from rodents caught in such traps.” “Liphatech believes that the proposed measures would encourage the use of possibly dangerous ‘home remedies’ and unregistered pesticides imported from other countries.”

**Response:**

- It was not the Agency’s intention to suggest that there is a one to one relationship between a snap trap and a certain amount of rodenticide bait. Rather, it is EPA’s contention that effective rodent control does not depend on a single pest control tool, whether chemical or nonchemical, but rather on an integrated pest management (IPM) approach, where several complementary strategies are combined to provide long-term rodent control. The selection of methods to use for controlling or managing situations will vary according to the nature of the situation, the knowledge and abilities of the applicator, and the tools and approaches available to that person. It is clear that sanitation, rodent-proofing, and other non-chemical, non-lethal approaches are important aspects in limiting the conditions conducive to the occurrence and continuation of rodent infestations. Where infestations occur, mechanical traps and adhesive traps may be of value in removing some or all individuals, depending upon the size and nature of the infestations.

**4. Comment**

*RRTF Comment:* “The incremental cost of requiring that consumers use a certified applicator for second-generation anticoagulants could significantly limit access to effective rodenticides.” (p. 68)

*Bell Laboratories Comment:* “By restricting the use of second generation anticoagulants the farmer will simply be forced into using higher quantities of less effective bait, and other alternatives, which may cause rodent populations to soar.

*Farnam Comment:* “Also of concern is the increased cost of requiring low-income consumers to hire a certified applicator to apply second-generation anticoagulants. EPA estimates that a single visit by a certified applicator costs about 1.7% of a low-income household’s annual income.”

**Response:**

- EPA believes that individual preferences determine whether consumers attempt to deal with rodent problems by themselves or whether they would rather contract the services of a pest control professional. The Agency further believes that the general public is unlikely to base decisions on whether or not to engage a pest control professional solely on the basis of whether the active ingredient in baits is a second generation anticoagulant, a first generation anticoagulant, or a non anticoagulant. Individuals who are likely to rely on available rodenticide baits when dealing with rodent problems will continue to do so irrespective of active ingredient. The unavailability of second generation anticoagulants in consumer products will not determine whether consumers will or will not hire a certified applicator. EPA believes that these are individual preferences that will be unaffected by the proposed mitigation.



## **5. Comment**

*RRTF Comments:* “[T]he EPA Proposal and the Impact Assessment on which it is based do not give adequate weight to the serious danger to public health if well intentioned efforts to mitigate some risks limit access to economical and efficacious tools for controlling rodents.” (p. 32) “EPA also appears inappropriately to relegate to the past the very real and persistent public health concerns posed by commensal rodents: ‘In the past, commensal rodents have been the main cause of rodent-related public health concerns in the United States. In recent years, however, white-footed mice and deer mice ... have been implicated in the transmission of diseases such as hantavirus pulmonary syndrome, Lyme disease, and human granulocytic ehrlichiosis.’” (p. 35)

*RISE Comment:* “In addition to direct physical harm, rodent-borne diseases are spread to people and animals through consuming food and water contaminated with rodent feces and urine, breathing in germs and dander from such contamination and being bitten by fleas, ticks and mites carried by rodents. These types of incidents and possibly unintentional poisonings from illegal alternative products will only escalate if certain segments of our population are left without readily available and affordable tools to eliminate and manage rats and mice in their homes and businesses.”

*Lipatech Comment:* “While we support efforts to reduce the number of [bait] exposure incidents, the data presented by EPA do not demonstrate a widespread or significant health hazards posed by exposure to rodents. Lipatech asserts that a proper analysis should consider the health risks and benefits (reduction in disease transmission, bites, food spoilage, etc.) resulting from availability of high effective, low-cost rodent rodents.”

## **Response:**

- The Agency has always recognized the serious public health implications posed by rodent vectored diseases, as well as the serious damage done by rodents to structures and to the food supply. The proposed mitigation will maintain economical and efficacious rodent control methods. Further, comments from the Centers for Disease Control, Department of Health and Human Services, are in support of the mitigation proposal (668)
- The non-restricted use products that are to be available to consumers will have been demonstrated to be of value in controlling commensal rats and/or house mice. Such products will be of value in controlling these categories of vectors. In the event of serious public health crises, public health officials and other personnel with applicators’ certifications covering the use of rodenticides are expected to become involved. With rare exceptions at most, the various “field” rodents (*Peromyscus* spp. mice, ground squirrels, etc.) that have been associated with recent public health incidents are not claimed on the labels of commensal rodenticide baits that would be affected by the reclassification of such products.

## **6. Comment**

*RRTF Comments:* “Low-income communities experience a disproportionate impact from rodent infestations...” (p. 36)

“As was acknowledged in EPA’s assessment, rodent control in urban communities is conducted by many entities, including residents, pest control services, and municipal agencies. Each has different levels of expertise and resources available to deal with rodent problems.

*Reckitt Benckiser Comments:* “The BEAD impact assessment similarly omits any calculations of the specific impact of the Agency’s proposal on low-income households. In doing so, as discussed in more detail in these comments. EPA has failed to provide estimates of the number of low-income and minority households that would be adversely affected by the Proposed Risk Mitigation.”

“Low-income users will be even more adversely impacted, potentially to the point that effective rodent control may not continue to be within their means. Rodenticide products play a particularly important role in the health of lower income households as they are most affordable and efficient form of rodent control available and lower income and urban households are the populations most vulnerable to rodent problems.”

*Bell Laboratories:* “This significant increase in the cost of rodent control will disproportionately impact low-income communities the most, which already bear the brunt of rodent infestations. The cost of hiring a Pest Management professional will be significantly higher yet.”

*Lipatech Comments:* “The proposed restrictions to protect children are founded on unsupported—and highly improbable—assumptions. If these important assumptions do not hold true, the proposed restrictions will significantly diminish the ability of consumers to control rodents in their own residence, will greatly increase the cost of rodent control efforts, and will disproportionately affect minorities, low-income citizens, and residents of inner-city [neighborhoods].

*Bell Laboratories Comment:* “Rodents are vectors for the spread of a number of diseases. These diseases are currently being under control with the use of second-generation anticoagulants.”

“Medical costs associated with rat bites, mechanical trap injuries, disease treatment, allergies and asthma become a quality of life versus a ‘social cost’ issue.”

**Response:**

- Indeed, low-income communities may experience a higher prevalence of rodent infestations than the “average” community. For example, according to the 2005 American Housing Survey, mice were found in 7.3 million households (6.7 percent of the U. S. total) overall, but were found in 9.1 percent of households below the poverty level.
- However, EPA disagrees with the commenter’s opinion that low-income communities would experience a disproportionate impact from the rodenticide bait mitigation proposal. The proposed mitigation will maintain economical and efficacious rodent control methods for communities of all income levels.
- As was acknowledged in EPA’s assessment, rodent control in urban residential communities is conducted by many entities, including residents, building management services, pest control services and municipal agencies. Each has different levels of expertise and resources available to deal with rodent problems.

## **7. Comment**

*RRTF Comment:* “As EPA notes, resistance to first-generation anticoagulant rodenticides, including warfarin, ““is known to be widespread in the United States.” Although EPA contends that such resistance can be counteracted “with baiting schemes that alternate periods of baiting with warfarin, or other first generation anticoagulants, with periods of no anticoagulant exposure,”” implementing such schemes is highly impractical, if not impossible, for the typical consumer, ...” (p. 43)

*Farnam Comment:* “The statement by EPA that classifying second-generation anticoagulants for restricted use should have an adverse impact on residential users in terms of significantly increased costs or reduced effectiveness is not accurate. This conclusion is based on the EPA assumption that other available rodenticide products are equally effective which is not true since first-generation anticoagulants require multiple feedings over several days and resistance to warfarin and other first-generation anticoagulants is widespread, which triggered the development of the second- generation anticoagulants in the first place.”

*Lipatech Comment:* “Rodents are known to develop resistance to anticoagulants, which has the potential to destroy the usefulness of these very important tools. Although we have [a] fairly good understanding of the mechanisms, the degree of warfarin resistance that is present in rodent populations today is not known. The rise of anticoagulant resistance is of great concern to the user community, and should be an important consideration in EPA’s proposal. The Proposed Decision’s simplistic dismissal of resistance concerns is ill considered and improper.

*Reckitt Benckiser Comment:* “If rodenticide manufactures must switch to less efficacious first generation active ingredients, for distribution to consumers it is reasonable to conclude there will be an increase in resistance exhibited by rodents to the first generation anticoagulant active ingredients, such as warfarin.”

### **Response:**

- Instances of rodent resistance to warfarin and likely to other first-generation anticoagulants was documented in the past in various parts of the U.S. However, the current prevalence of such resistance in the U.S. is not known, as no surveys of warfarin resistance have been conducted in the U.S. for about 30 years (Kaukeinen and Prescott, 2007). Furthermore, as discussed by Borchert (2007, Docket comment No. EPA-HQ-OPP-2006-0955-616), the genetic basis for resistance on U.S. rodents has not been adequately investigated. With some exceptions (e.g., Chicago), there is little recent information on the occurrence or prevalence of resistance to first-generations anticoagulants. While restricted use classification status for second-generation anticoagulants is expected to result in increased consumer use of first generation anticoagulants, we do not know to what extent resistance to such compounds might limit the effects of such agents. If localized pockets of resistance occur, relief could be obtained using non-anticoagulant control methods available to consumers. In more extreme cases, use of second-generation anticoagulants by certified applicators working for private companies and/or government agencies may be required.

Kaukeinen, D. and C. Prescott. 2007. Warfarin Revisited: New Information on an Old Rodenticide. Pest Control Web Exclusive, 3/21/2007, at:

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88BE7C9EAB1886171](http://www.pestcontrolmag.com/ME2/dirmod.asp?sid=&nm=&type=news&mod=News&mid=9A02E3B96F2A415ABC72CB5F516B4C10&tier=3&nid=6D480F7DCABB4BB88BE7C9EAB1886171)