

An Evaluation of Michigan's Potassium Iodide (KI) Distribution Program

Final Report

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I. Executive Summary

Potassium iodide (KI) is an antinuclear prophylactic capable of preventing thyroid cancer by blocking the uptake of radioactive iodine, a carcinogen commonly emitted during a radiological release at a nuclear power plant (NPP). In 2009, the Michigan Department of Community Health (MDCH) made KI available at no cost to all residents living within a 10-mile radius of one of Michigan's three NPPs (Enrico Fermi in Newport, Palisades in Covert, and D.C. Cook in Bridgman). These radii have been designated as Emergency Planning Zones (EPZs). MDCH mailed KI vouchers, redeemable by interested residents at participating local pharmacies, to all EPZ addresses.

MDCH conducted a small scale evaluation of year one of this 5-year distribution project in an effort to: 1) estimate overall KI coverage and KI coverage stratified by EPZ, based on information from redeemed vouchers; and, using a telephone survey and a postcard mailing of people who had received the voucher, 2) assess general nuclear emergency preparedness among adult Michigan EPZ residents; 3) determine the reasons for KI voucher use or non-use; and 4) gauge basic KI use knowledge among adult Michigan EPZ residents; and 5) identify program areas needing improvement for future KI distribution campaigns. Findings of the evaluation include:

- Overall, KI coverage for Michigan's 78,500 EPZ residences was 5.32%. Residential KI coverage, stratified by EPZ, was 5.16% for Enrico Fermi, 5.05% for Palisades, and 5.81% for D.C. Cook.
- Individual KI coverage, based on the percentage of EPZ-dwelling individuals with ready access to KI, was 5.15% for Michigan's combined EPZs. Individual KI coverage, stratified by EPZ, was 6.17% for Enrico Fermi, 5.45% for Palisades, and 3.86% for D.C. Cook.
- Of the 153 randomly selected residents within the EPZs who completed the survey (78 KI voucher users and 75 KI voucher non-users), 42.5% of respondents had done "nothing" to prepare for an emergency event at the plant. Among those indicating they had done some kind of planning, 20.3% had planned an evacuation route, 14.4% had purchased extra water, 11.8% had purchased extra food, and only 6.5% of interviewees had organized a family meeting place. Further, 15.7% of interviewees stated that they didn't know what they would do if they heard a 3-minute steady siren blast.
- The majority of telephone interviewees (82.4%) had previously heard about Michigan's KI distribution program, and 78.6% had heard of it from the MDCH voucher mailing. For those who had obtained KI, responses to the question: "Why did you decide to get KI?" included: "to be prepared" (57.7%), "to be safe" (18.0%), "it was free" (14.1%), and "close proximity to the plant" (9.0%). 12.8% of respondents said they got KI "because it was recommended / told to do so."
- For those who had not obtained KI, 36% said they didn't know about the program" and 12% stated they had expected to receive a KI voucher in the mail but failed to receive one. 10.7% said they were "too busy to redeem voucher". Only about 10% indicated that they did not get KI because they were not interested in the program.
- Of those respondents participating in the KI program, 57.7% correctly identified KI as protecting only the thyroid gland from radiation, but 35.9% "didn't know" which part of the body KI protects.

These results emphasize the need for improved communications with Michigan residents during future KI distribution campaigns to ensure that individuals have sufficient information to make an informed choice and that they fully understand the use of KI. Further, a large number of EPZ residents claimed to have done "nothing" in preparation for any type of emergency event,

indicating the need for expanded community promotion of emergency preparedness awareness. A workgroup of state and county agencies involved in nuclear power plant emergency planning should develop programs to address issues with the KI voucher mailing and with the messages for the public.

II. Background

Potassium iodide, or KI, is a safe and effective non-prescription drug that prevents the uptake of radioactive iodine and reduces the risk of developing thyroid cancer. Radioactive iodine is a carcinogen commonly released during nuclear power plant (NPP) accidents. KI prevents the uptake of radioactive iodine by saturating the thyroid with an innocuous form of iodine, thereby blocking the uptake of harmful radioactive iodine by the thyroid gland. The thyroid produces important hormones responsible for the regulation of heart rate, blood pressure, and temperature, and so it remains critical to keep it healthy.

In 2001, the U.S. Nuclear Regulatory Commission (NRC) revised a section of their emergency preparedness rules to require that all states containing populations living within 10 miles of an NPP consider offering KI to the general public as an additional protective measure in the unlikely event that a disaster should occur at an NPP. [The 10-mile radius surrounding an NPP has been termed an Emergency Planning Zone (EPZ).] Further, the NRC extended an offer of two free KI doses per person living or working within an EPZ to any state electing to provide KI as a precautionary prophylaxis. However, states accepting the NRC's KI offer were required to devise, implement, and fund all KI distribution and public educational plans.

Currently, 21 of the 33 states with populations living or working within 10 miles of an NPP, including the state of Michigan, have accepted the NRC's free KI offer. Additionally, two states have purchased KI for public distribution using their own funds. States have implemented a wide variety of KI distribution plans including: the distribution of KI tablets at local health departments and schools, the provision of KI tablets via direct mailing to EPZ residences, and the provision of KI vouchers redeemable for KI tablets at participating pharmacies to EPZ residents.

Presently, the state of Michigan has three operating NPPs: Enrico Fermi, Donald C. Cook, and Palisades. The Fermi plant is located in Newport, Michigan, and the EPZ associated with this plant spans portions of both Monroe and Wayne Counties. The Donald C. Cook plant is located in Bridgman, Michigan, and its EPZ includes parts of Berrien County. The Palisades plant is located in Covert, Michigan, and the EPZ associated with this nuclear power plant covers areas of both Van Buren and Allegan Counties. Approximately 200,000 residents live within these three 10-mile EPZs. For many years, Michigan has maintained KI stockpiles adequate to supply KI to emergency responders and homebound individuals incapable of evacuation during the unlikely event of a nuclear power plant disaster. Stockpiles do not include KI provisions for the general public living in Michigan's three EPZs.

At the outset of the NRC's KI offer, the benefit of providing KI to Michigan's EPZ residents as a precautionary prophylaxis to counteract harmful effects in the event a radiological

release from an NPP should occur was unclear to the Michigan Department of Community Health (MDCH), the (then named) Michigan Department of Environmental Quality (MDEQ), and the Michigan State Police (MSP). Numerous and significant implementation questions raised by other states and national organizations remained unanswered. Michigan subsequently deferred making a decision on whether to publicly distribute KI until further and more complete information regarding KI distribution was made available. In early 2004, results from a study conducted by the National Research Council of the National Academy of Sciences (NAS) were issued and concluded that “KI is an important agent for protection against thyroid-related health effects of exposure to radioiodine. . . KI should be available to everyone at risk of significant health consequences from accumulation of radioiodine in the thyroid in the event of a radiological incident.”¹ The report noted additional support for this stance from both the American Thyroid Association and the American Academy of Pediatrics. Unfortunately, the 2004 NAS report failed to suggest best practices to implement the recommendation for public KI distribution. However, the NAS report did detail previously executed state approaches for public KI distribution.

Resultant of the 2004 NAS report findings and its recommendation for public KI distribution, MDCH convened a series of meetings with MDEQ, MSP, as well as with public health and emergency management representatives from the five affected Michigan EPZ counties (Allegan, Berrien, Monroe, Van Buren, and Wayne), to discuss Michigan’s response to the NRC’s KI offer. Numerous concerns related to costs, impacts on existing emergency plans, and perceived benefits of a KI public distribution program were discussed. At the conclusion of these meetings, MDCH determined that there were many compelling reasons to accept the NRC offer, most notably:

- KI is a safe, medically effective drug when taken in the appropriate dosage, at the appropriate time, and under specific radiological exposure conditions.
- Making KI available to the public pre-event ensures that an extra measure of protection against a radiological release is provided to Michigan’s citizens who choose to take advantage of it.
- Should an actual or threatened radiological release occur at one of Michigan’s NPPs, it would be difficult to justify non-acceptance of the NRC’s KI offer to the public.

MDCH accepted the NRC’s KI offer in February of 2008. MDCH proposed an implementation plan designed to minimally impact MDEQ, MSP, and local public health and county emergency management agencies. MDCH’s KI distribution plan consisted solely of pre-event KI distribution; post-event KI distribution plans were not made. Michigan’s pre-event KI distribution plan involved the redemption of mailed KI vouchers, which were mailed to all residential and business EPZ addresses annually beginning in 2009, for a supply of KI tablets at participating local pharmacies collaborating with MDCH. This KI distribution program was modeled on a similar public KI distribution program previously implemented in Minnesota.

Using an address list purchased from a direct mail vendor, approximately 83,250 KI vouchers were mailed to residences and businesses located within Michigan’s three EPZs on

October 1, 2009. Of these KI vouchers, roughly 78,500 were mailed to residential addresses and roughly 4,800 were mailed to business addresses. General information regarding KI, KI use, and KI voucher redemption was enclosed with KI vouchers. A copy of the informational mailing distributed by MDCH, including the KI voucher, may be found in Appendix 1. Redeemed KI vouchers were returned to MDCH by collaborating pharmacies and used to populate a database detailing demographic information on those Michigan residences and businesses that redeemed the provided KI voucher. Beyond the directly mailed KI vouchers, vouchers were also made available to all interested persons at participating pharmacies. Any interested person could request KI by filling out one of the available vouchers. No persons were screened for residence location or denied KI tablets at the collaborating pharmacies.

At the time of the KI voucher mass mailing, media outlets provided information to the public about Michigan's KI distribution program. These included television broadcasts, newspaper advertisements, magazine articles, and radio aired reports. In an effort to bolster public knowledge of Michigan's KI distribution program, MDCH created a website to provide general KI information and to field emailed public inquiries or concerns about KI or the public KI distribution program. Additionally, MDCH held public forums near each of the plants and manned a public inquiry telephone line to provide additional sources of information to the public about the distribution of KI vouchers and proper KI use.

III. Aims

In an effort to understand the public's general nuclear power plant emergency preparedness knowledge, determine the effectiveness of Michigan's KI distribution program, inform future KI distribution policy in Michigan, and better serve its constituents regarding public health emergency response preparedness, MDCH conducted an evaluation of year one of the five-year KI distribution program. This evaluation focused on the effectiveness of the KI distribution program in reaching individuals who live within the 10-mile EPZs. It did not include an evaluation of the program's effectiveness in reaching businesses and institutions. Although these entities were of interest, the assessment of issues involved relevant to businesses and institutions would have required greater resources than were available for this project.

The primary aims of MDCH's KI distribution program evaluation were:

- To determine the overall residential KI coverage for Michigan's three EPZs as well as the residential KI coverage stratified by EPZ.
- To estimate the total number of individuals with ready access to KI in Michigan, both overall and stratified by EPZ.
- To assess general nuclear emergency preparedness among adult Michigan EPZ residents. To gauge general KI use knowledge among adult Michigan EPZ residents KI voucher users.
- To identify program areas needing improvement for future KI distribution campaigns.

IV. Methodology

Study Population

The study population consisted of 78,503 residences located within Michigan's three EPZs, which surround the Enrico Fermi, Palisades, and Donald C. Cook NPPs. The Enrico Fermi, Palisades, and Donald C. Cook EPZs included 42,332, 14,630, and 21,541 residences, respectively. These three Michigan EPZs span sections of Allegan, Berrien, Monroe, Van Buren, and Wayne Counties. Appendix 2 highlights pertinent demographic data collected by the U.S. Census Bureau for each aforementioned EPZ county.

KI Coverage (Residential and Individual):

Michigan's overall KI coverage and KI coverage stratified by EPZ was determined through use of previously collected data. Collaborating pharmacies returned all redeemed KI vouchers to MDCH. Redeemed KI vouchers contained information on the redeemer's residential street address, residential telephone number, the number of adults and children living at the residence, as well as the name of the redeemer. This data was subsequently entered into MDCH's KI voucher database. A separate database, known as the MDCH bulk mailing database, contained the purchased list of all of the Michigan addresses mailed a KI voucher in October of 2009.

In order to determine Michigan's overall residential KI coverage, the total number of redeemed vouchers, as ascertained through MDCH's KI voucher database, provided the numerator estimate. The total number of mailed residential EPZ vouchers, as detailed by MDCH's bulk mailing database, served as the denominator for this estimate. In order to determine Michigan's residential KI coverage stratified by EPZ, the total number of redeemed vouchers per EPZ, as gathered through MDCH's KI voucher database, yielded the numerator estimates. P.O. boxes and non-EPZ addresses were not included in numerator counts. The total number of mailed vouchers per EPZ served as the denominator for these estimates. The MDCH KI voucher database was matched with the MDCH bulk mailing database according to residential address. Residential addresses present in the MDCH KI voucher database but not included in the bulk mailing database were excluded from data analysis.

Additionally, because the MDCH KI voucher database contained information on the total number of adults and children residing at each residence redeeming a KI voucher, an estimate of the total number of individuals with access to KI during a nuclear emergency event was determined by expanding this data. Michigan's overall individual KI coverage and individual KI coverage stratified by EPZ were calculated using EPZ population estimates* as the denominator. The total number of individuals with access to KI, as determined via MDCH's KI voucher database, served as the numerator for these calculations.

To further detail the MDCH KI voucher database, a complete list of the collected variables follows: name of individual redeeming the voucher, residential street address, residential phone number, number of adults living at the residential address, number of children living at the residential address, name of the pharmacy where the KI was picked up, the number of boxes of KI obtained, the KI manufacturer's lot number, and the date of KI pick-up.

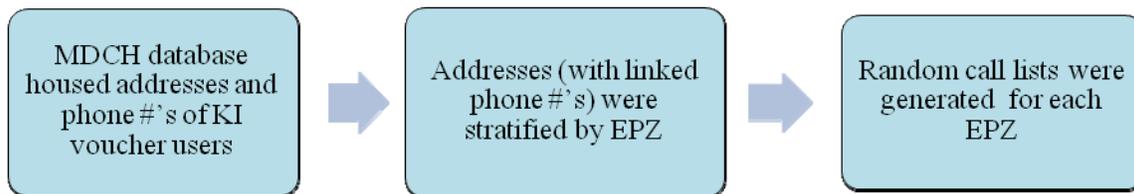
* Nuclear power plants are required to make population estimates as part of the planning for an evacuation. Each plant's evacuation estimates were provided to MDCH by Michigan State Police; residence populations were derived from these estimates.

Telephone Surveys:

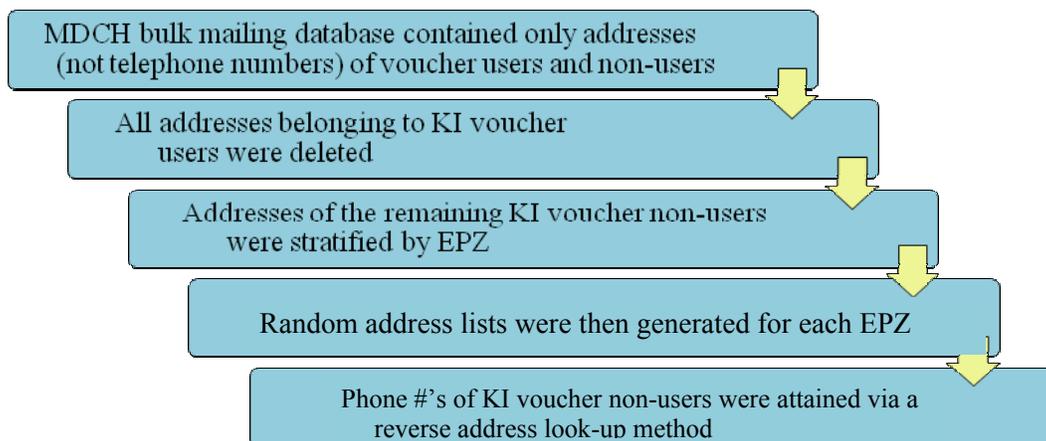
A telephone survey instrument was developed to collect information from adult (≥ 18 years) Michigan EPZ residents in the following categories: general and nuclear emergency preparedness, reasons for KI voucher use or non-use, KI use knowledge, and demographics. This telephone survey instrument included both closed-ended and open-ended questions, some of which had been validated in previous KI distribution campaigns.^{2,3,4} Demographic questions were taken from the 2010 Behavioral Risk Factor Surveillance System Questionnaire.⁵ A copy of the telephone survey instrument may be found in Appendix 3.

A random sample of residences, stratified by EPZ and KI voucher use status, was generated using computer software. This was to ensure that both KI voucher users and KI voucher non-users from each EPZ were represented in the study sample. For randomly selected KI voucher user addresses, telephone numbers were available from the MDCH KI voucher database. However, telephone numbers were not readily available for randomly selected KI voucher non-user addresses, as the MDCH bulk mailing database only included residential addresses and not phone numbers. Consequently, phone numbers corresponding to randomly selected addresses for KI voucher non-users were enumerated using a reverse look-up method (e.g. the white pages). The sampling strategies employed for both KI voucher users and KI voucher non-users are depicted graphically below.

KI Voucher Users:



KI Voucher Non-Users:



Eligible participants were defined as those Michigan adult EPZ residents (≥ 18 years) who were residing at said EPZ residence prior to October 1, 2009 (the date KI vouchers were bulk-mailed by MDCH). Given the time and financial constraints of this project, it was projected that

25 KI voucher users and 25 KI voucher non-users from each EPZ would complete the telephone interview, for a total of 150 respondents. Data gathered during the telephone interviews were entered into a password protected Microsoft Excel database.

The interviewer strictly adhered to the survey script in an effort to maximize consistency in survey delivery across participants. A personal introduction was followed by a brief synopsis of MDCH's KI distribution program and the value of survey participation. Potential respondents were then consented, which included informing the participant of the survey's purpose, noting that participation is completely voluntary, and declaring that the participant may refuse to answer a question or end the interview at any time. Verbal consent dialog may be found in the survey introduction in Appendix 3.

A call tracking sheet was employed to document and organize the following interview parameters: date of call, time of call, telephone number, call attempt number, what type of contact was made (i.e. disconnected, no answer, answering machine, answered), name of the contacted individual, and call outcome (i.e. agreed to participate, rescheduled for future participation, refused to participate, hung-up, left message on answering machine). If no answer occurred or an answering machine was reached, an additional call attempt was made to reach an individual at that number. If two calls were made, one of the call attempts was made during non-working hours. Non-working hours included times from 5 P.M. to 8 P.M. on Mondays through Fridays and times between 9 A.M. and 7 P.M. on Saturdays and Sundays. If an answering machine was reached, a standardized message about the survey was left along with the interviewer's contact information for individuals interested in participating at another time. Only one message was left at any one residence. Appendix 4 contains a copy of the call tracking sheet and Appendix 5 details the answering machine dialog. A database was created and populated with the information documented on the call tracking sheets.

Mailed Questionnaires

A random sample of residences that did not redeem the provided KI voucher was mailed a short, three-item questionnaire. The mailing consisted of a postcard-sized document containing a few key questions about emergency preparedness and KI voucher non-use. Questions were a subset of those posed in the telephone surveys. This mailing specifically aimed to determine the most common reasons for KI voucher non-use. The mailed surveys were number coded by EPZ (Fermi=1, Palisades=2, Cook=3). The top portion of the mailing briefly described MDCH's request for information from Michigan's EPZ residents to create more comprehensive emergency preparedness plans and also provided instructions for completing the questionnaire in the bottom portion of the document. The document was perforated so that the questionnaire portion was easily detachable for return mailing to MDCH. For convenience, return postage to MDCH was prepaid. Non-deliverable questionnaires were returned to MDCH.

One-thousand questionnaires were mailed to each of Michigan's three EPZs. The sampling strategy for this portion of the program evaluation employed random sampling of KI voucher non-users stratified by EPZ. Copies of the questionnaires sent to the Enrico Fermi, Palisades, and D.C. Cook EPZs may be found in Appendices 6, 7, and 8, respectively. Data gathered through

this portion of Michigan’s public KI distribution evaluation was entered into a password protected Microsoft Excel database.

Geographical Mapping

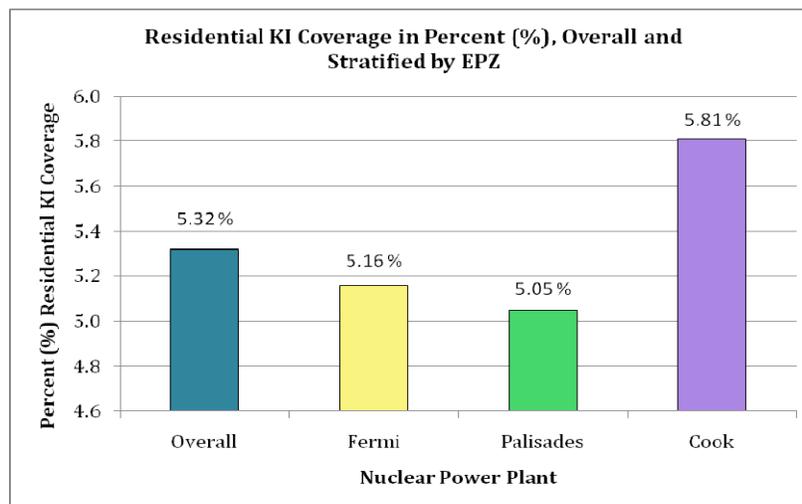
ArcView GIS was used to map the geographical distribution of the residences that redeemed the KI vouchers. The street addresses of the residences that obtained KI were geocoded to attain latitude and longitude coordinates. Geocodes were then mapped using ArcView GIS software. Additionally, the percentage rates of KI voucher use were calculated for all census tracts contained within each of Michigan’s three EPZs. The relationship between the proximity of census tracts to the NPP epicenters and KI voucher use status was examined.

V. Results

i. KI Coverage (Residential and Individual)

Overall, KI coverage for Michigan’s 78,500 EPZ residences was 5.32%. Residential KI coverage, stratified by EPZ, was 5.16% for Enrico Fermi, 5.05% for Palisades, and 5.81% for D.C. Cook. These percentages are presented in Figure 1.

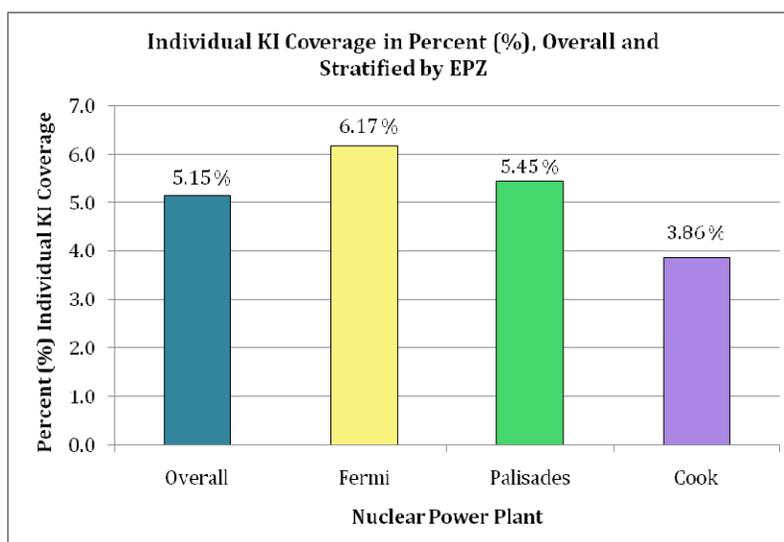
Figure 1. Residential KI Coverage by Percent (%), Overall and Stratified by EPZ*



* Percentages do not include P.O. Boxes or non-EPZ residential addresses.

KI Individual Coverage:

Overall, individual KI coverage for Michigan’s combined EPZs was 5.15%. Individual KI coverage, stratified by EPZ, was 6.17% for Enrico Fermi, 5.45% for Palisades, and 3.86% for D.C. Cook. These percentages are presented in Figure 2. Table 1 reports the counts of individuals with ready access to KI, stratified by EPZ. Counts have been disaggregated by adult versus child status.

Figure 2. Individual KI Coverage by Percent (%), Overall and Stratified by EPZ

* Percentages do not include P.O. Boxes or non-EPZ residential addresses.

Table 1. Breakdown of Individuals (Adult versus Children) with Access to KI, Overall and Stratified by EPZ

EPZ Area	Adults	Children	Total
Overall	4755	961	5716
Fermi	1548	251	1799
Palisades	2600	500	3100
Cook	8903	1712	10615

*Numbers do not include P.O. boxes and residences not included in the KI voucher mailing.

There were 11 Enrico Fermi EPZ P.O. box addresses, Palisades EPZ P.O. box addresses, and 21 D.C. Cook EPZ P.O. box addresses for which a KI voucher was redeemed. These addresses were not considered in the determination of residential or individual KI coverage, as it was impossible to know whether the residence associated with the P.O. box fell within EPZ boundaries or not. Additionally, there were 83, 29, and 53 EPZ-outlying residences for which a KI voucher was redeemed for Enrico Fermi, Palisades, and D.C. Cook, respectively. These residences were also not included in the determination of residential or individual KI coverage, as they were not part of the denominator population mailed a KI voucher by MDCH.

ii. Telephone Survey

A total of 153 Michigan residents completed the survey, including 78 KI voucher users and 75 KI voucher non-users. 25 KI voucher users participated from the Enrico Fermi EPZ, 26 KI voucher users participated from the Palisades EPZ, and 27 KI voucher users participated from the D.C. Cook EPZ. 25 KI voucher non-users from each EPZ participated in the telephone interview.

Response Rates:

Participation rates were similar between KI voucher users and KI voucher non-users, at 56.9% and 63.0%, respectively, as indicated by Table 2. However, more KI voucher non-users

had disconnected telephone numbers than KI voucher users. It should be noted that telephone numbers gathered for the KI voucher non-users were found via a white pages reverse address look-up method and approximately 1/3 of input addresses were either not found by the system or yielded no associated telephone number.

Table 2. Response Rates by KI Voucher Use

	KI Voucher Users	KI Voucher Non-Users
Total Residences Called	322	416
Disconnected Numbers	21 (6.5%)	94 (22.6%)
Operational Numbers	301 (93.5%)	322 (77.4%)
Answered Calls	137 (45.5%)	119 (37.0%)
Refusals	59 (43.1%)	44 (37.0%)
Acceptances	78 (56.9%)	75 (63.0%)

Demographic Variables:

The distribution of demographic variables for telephone interviewees, namely age, sex, race, education, and employment status, both overall and stratified by KI voucher use status, may be found in Table 3. Overall, the mean age of telephone participants was 61.7 (SD 14.5). 40.5% of respondents were male, while 59.5% were female. 91.9% of participants were white, 4.7% were African American, and 3.4% were Native American. 93.2% of interviewees had graduated high school. Regarding employment status, 36.0% of respondents were employed, 11.3% were unemployed, and 52.7% were retired. Generally, these demographic breakdowns were similar by KI voucher use status.

Table 3. Demographic Information on Telephone Interviewees, Overall and by KI Voucher Use Status

<u>Demographic Variable</u>	<u>Overall</u>	<u>KI Voucher Users</u>	<u>KI Voucher Non-Users</u>
Age in Years (SD)	61.7 (14.5)	63.3 (13.7)	60.1 (15.2)
Sex			
Male	40.5 %	39.7 %	41.3 %
Female	59.5 %	60.3 %	58.7 %
Race			
White	91.9 %	96.1 %	87.7 %
Black	4.70 %	2.60 %	6.80 %
Native American	3.40 %	1.30 %	5.50 %

Education			
< High School	6.80 %	7.90 %	5.60 %
High School	34.5 %	28.9 %	40.3 %
Some College	25.7 %	26.3 %	25.0 %
College	16.9 %	17.1 %	16.7 %
Other	16.2 %	19.7 %	12.5 %
Employment Status*			
Employed	36.0 %	32.5 %	38.4 %
Unemployed	11.3 %	7.80 %	13.7 %
Retired	52.7 %	58.4 %	46.6 %

* Percentages may not sum to one because not all employment status groups have been presented in the table.

Knowledge of Residence within EPZ:

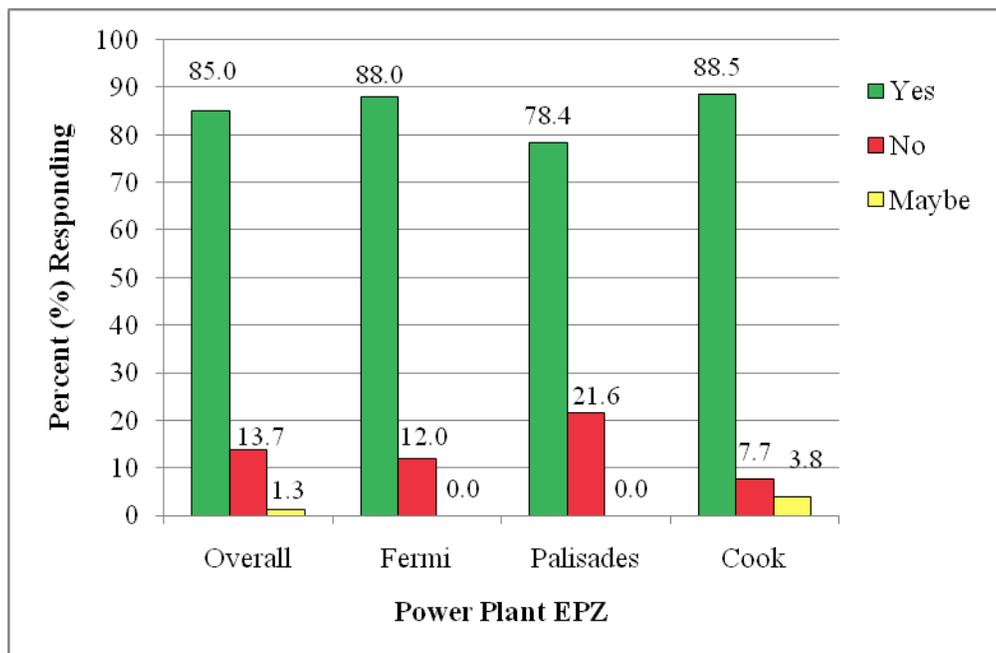
Overall, when interviewees were asked “Do you live within 10 miles of the [*plant name*] nuclear power plant?,” 76.5% answered “yes”, 3.9% answered “no”, and 19.6% answered “don’t know”. For Enrico Fermi, results were 72.0% “yes”, 0.0% “no”, and 28.0% “don’t know”. For Palisades, results were 76.5% “yes”, 11.8% “no”, and 11.8% “don’t know”. For D.C. Cook, results were 80.8% “yes”, 0.0% “no”, and 19.2% “don’t know”. It should be noted that many of the interviewees responding “don’t know” to this question knew they lived near the outer edge of the 10-mile EPZ, but were unsure as to which side of the EPZ border they lived on. They did not appear to be wholly unaware that a nuclear power plant was located in the general vicinity of their residence.

Receipt of Emergency Preparedness Information from the NPP:

Overall, when interviewees were asked “Do you remember receiving a [*booklet/calendar*] from the local nuclear power plant providing information on emergency preparedness?,” 85.0% responded “yes”, 13.7% responded “no”, and 1.3% responded “maybe”. These breakdowns, along with EPZ specific breakdowns, may be found graphed in Figure 3. It should be noted that 4 participants from the D.C. Cook EPZ suggested that subsequent plant mailings not be presented in calendar format, stating that the calendar format actually masks the important emergency preparedness information it attempts to convey.

Of those participants stating that they remembered receiving a booklet or calendar from the local NPP, 69.2% reported knowledge of where the booklet/calendar was currently located in the residence, whereas 26.9% reported that they did not know where the information was located in the residence. 3.9% of interviewees stated that they might know where the information was kept in the residence, if given time to search for it.

Figure 3. Response Breakdowns for Receipt of Emergency Preparedness Information from Nuclear Power Plant, Overall and by EPZ

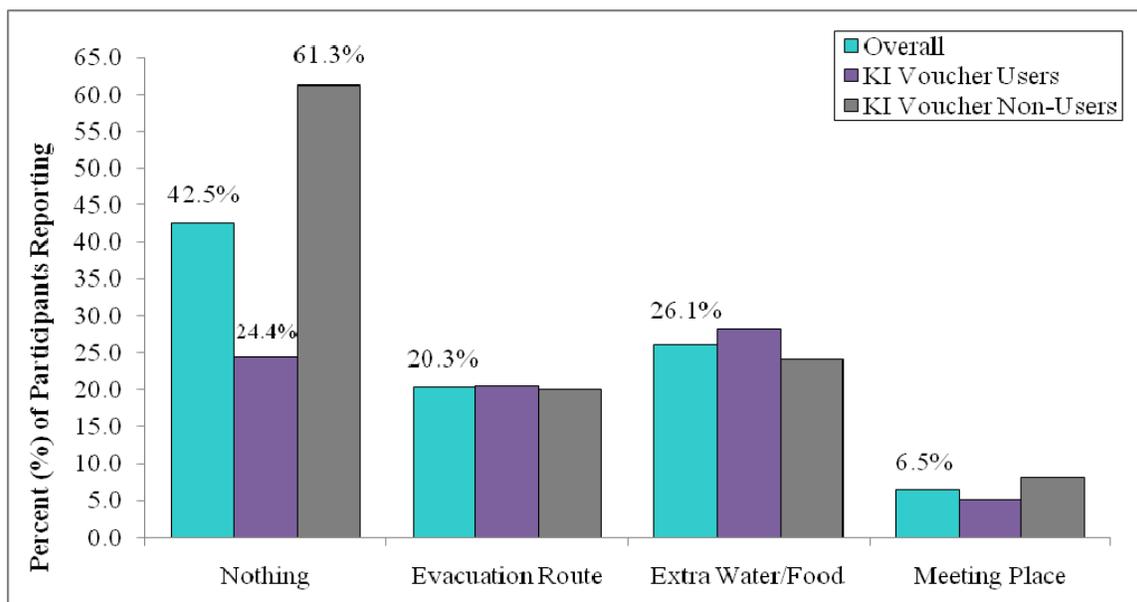


Preparation for an Emergency Event at the NPP:

A variety of answers were given when telephone interviewees were asked “What have you or other household members done to prepare for an emergency event at the nuclear power plant?” (More than one answer could be given by each respondent.) 20.3% of interviewees said they had planned an evacuation route, 14.4% stated that they had purchased extra water, and 11.8% mentioned purchasing extra food. Only 6.5% of interviewees reported having set up a family meeting place, 5.9% mentioned reading the mailed NPP emergency information, and only 3.9% said they had prepared an emergency kit.

Most notably 42.5% of respondents said they had done “nothing” to prepare for an emergency event at the plant. A large discrepancy existed between KI voucher users and KI voucher non-users regarding this response, with KI voucher non-users reporting having done “nothing” much more often than KI voucher users (statistically significant difference at $p=.0001$). Additionally, 44.9% of KI voucher users cited getting KI as a nuclear emergency preparedness activity. Selected responses to this question are depicted in Figure 4.

Figure 4. Emergency Preparedness Actions Cited by Telephone Interviewees, Overall and Disaggregated by KI Voucher Use Status*



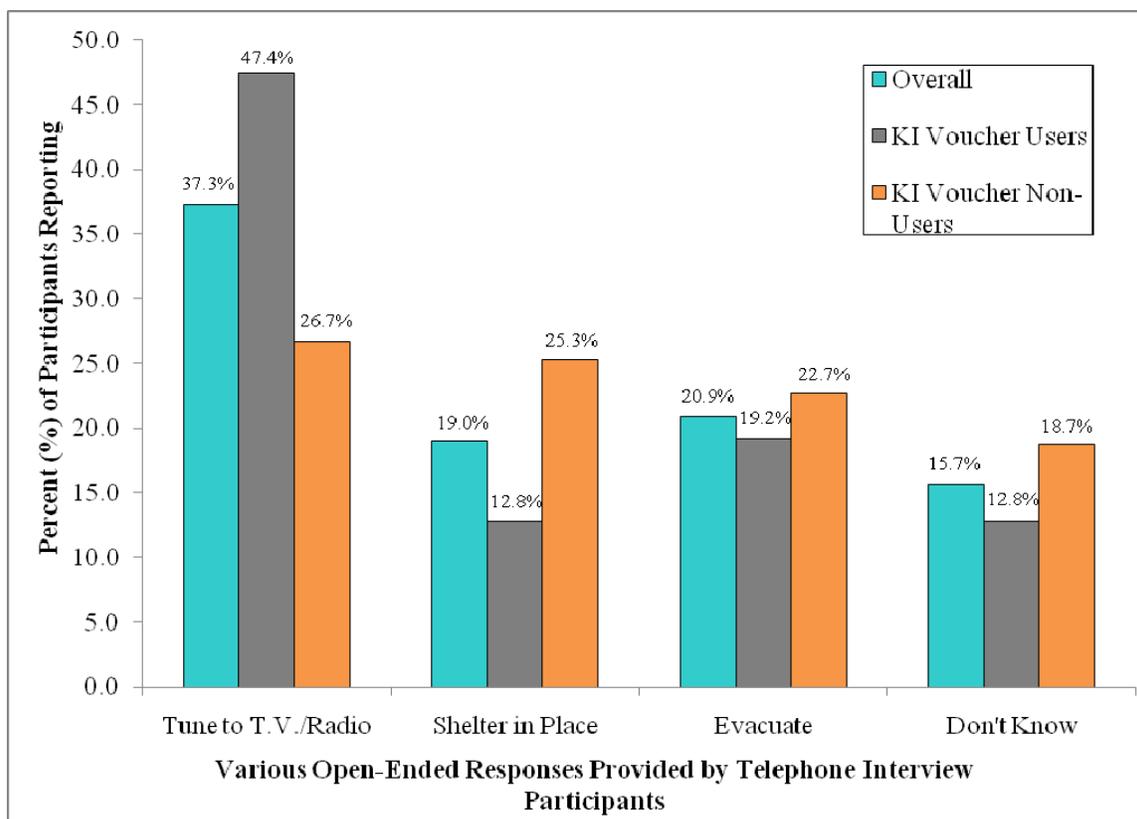
* Percentages may not sum to one. Given the open-ended nature of this question, respondents were not limited to a single response. All response categories are not represented in this graph.

Cited Responses to a 3-Minute Steady Siren Blast:

When telephone interviewees were asked “What would you do if you were at home and heard a 3-minute steady siren blast?” 37.3% said they would tune to a television or radio station, 20.9% stated they would evacuate immediately, and 19.0% said they would shelter-in-place. 15.7% of interviewees stated that they didn’t know what they would do if they were to hear a 3-minute steady siren blast. As illustrated in Figure 5, KI voucher users were more likely to report that they would check a television or radio station and less likely to state that they would immediately shelter-in-place compared to KI voucher non-users.

As an aside, 11 respondents stated that they would “prepare to die” or “prepare for the worst” if they were to ever hear a 3-minute steady siren blast signaling an emergency event had occurred at the local NPP. This response was not provided in a flippant manner, but rather appeared to reflect a genuine attitude regarding nuclear emergencies. Additionally, 31 interviewees stated they would evacuate without consulting the Emergency Alert System or being prompted to do so by emergency personnel.

Figure 5. Common Responses to the Question, “What Would You Do if You Heard a 3-Minute Steady Siren Blast?”, Overall and Disaggregated by KI Voucher Use Status*



* Percentages may not sum to one. Given the open-ended nature of this question, respondents were not limited to a single response. Additionally, all response categories are not represented in this graph.

Knowledge of KI Distribution Program:

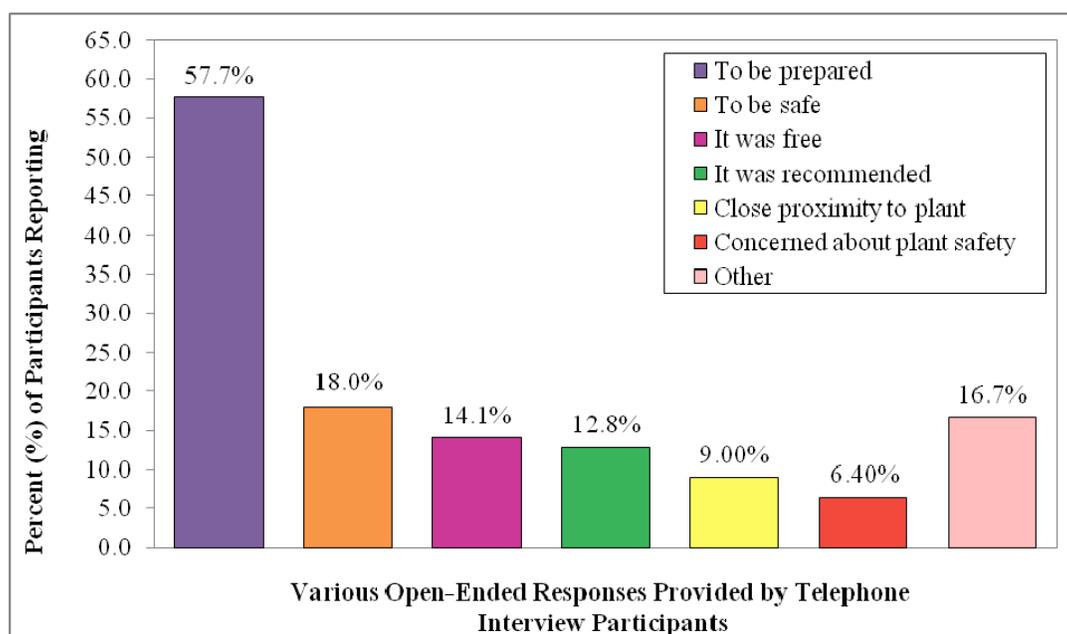
82.4% of telephone interviewees stated they had heard about Michigan’s KI distribution program and 17.6% reported not knowing about the program. When respondents were asked how they specifically learned about the KI distribution program, the most common response provided was “MDCH’s mailing” (78.6%). Additionally, 22.2% reported learning about the program through newspaper articles and 9.5% said they learned about the program via word of mouth from friends and/or neighbors. Other provided responses were via television (8.7%), town meetings (1.6%), radio (1.6%), internet (0.8%), other (3.2%) and “don’t know” (5.6%). These percentages do not sum to one because respondents were not restricted to a single response; 33 individuals, or 26.2% of respondents who had heard about the KI distribution campaign, indicated they had heard about it through at least two different venues.

Reasons Cited for KI Voucher Use:

Answers provided by telephone interviewees in response to the open-ended question “Why did you decide to get KI?” are illustrated in Figure 6. The most common response provided to this inquiry was overwhelmingly “to be prepared” at 57.7%. Interestingly, a fairly common response to this question was “because it was recommended / I was told to do so” at 12.8%. Despite the frequency of this response, MDCH neither recommended that EPZ residents “should” get KI nor instructed EPZ residents to redeem KI vouchers, but rather offered the opportunity and means to do so.

Only two of the interviewed KI voucher users stated that they did not know where their KI supply was currently located in their residence. Both of these respondents stated that they would not stay in the house to search for KI upon being instructed to evacuate by emergency personnel.

Figure 6. Reasons Reported by Telephone Interviewees for KI Voucher Use*

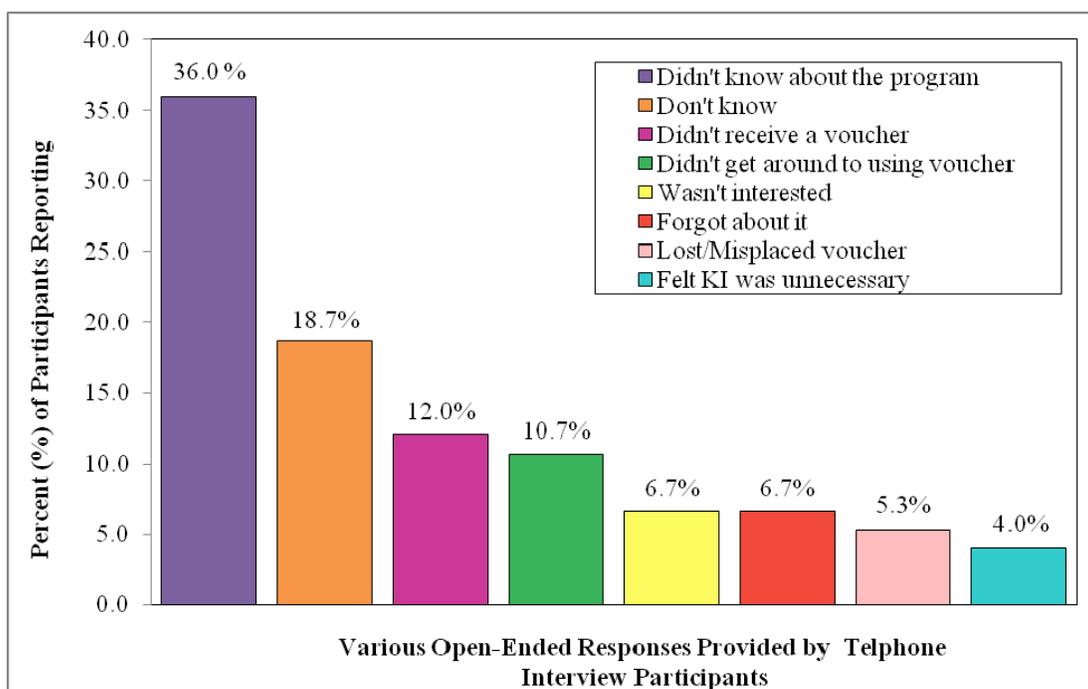


* Percentages may not sum to one. Given the open-ended nature of this question, respondents were not limited to a single response.

Reasons Cited for KI Voucher Non-Use:

Answers provided by telephone interviewees in response to the question “Why did you decide not to get KI?” are illustrated in Figure 7. The overwhelmingly most common response to this question was “didn’t know about the program” (36.0%). Further, 12.0% of KI voucher non-users stated they expected to receive a KI voucher in the mail but failed to receive one. Thus, a total of 48% of interviewed KI voucher non-users did not participate in the program due to communication breakdowns. Other common reasons cited for KI voucher non-user were “don’t know” (18.0%) and “too busy to redeem voucher” (10.7%).

Figure 7. Reasons Reported by Telephone Interviewees for KI Voucher Non-Use*

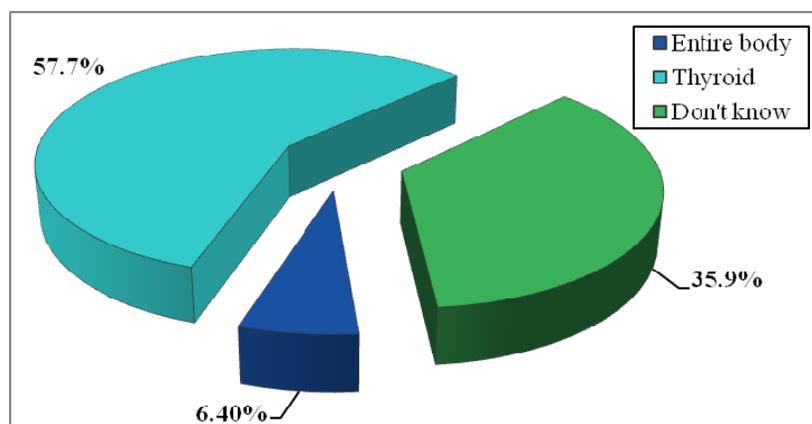


* Percentages may not sum to one. Given the open-ended nature of this question, respondents were not limited to a single response.

General KI Knowledge:

When KI voucher users were asked what portion of the body KI protects from radiation, 57.7% correctly answered the thyroid gland. However, 35.9% of KI voucher users “didn’t know” which part of the body KI protects and 6.4% incorrectly assumed that KI protects the entire body from radiation.

Figure 8. Responses to the Question, “What Portion of the Body Does KI Protect from Radiation?”



When KI voucher users were asked, “What is your understanding of when KI tablets should be taken to work effectively?”, 38.5% of KI voucher users reported that they would ingest

KI as soon as they were instructed to do so by emergency officials, but 43.6% reported that they “didn’t know” when they should take KI. Further, 6.4% stated that they would take KI as soon as the sirens began to sound, while 5.1% would consult the KI box instructional insert and 3.9% would confer with the NPP booklet/calendar.

iii. Mailed Questionnaires

Of the 3,000 short questionnaires mailed to Michigan EPZ residents, 580 questionnaires (19.3%) were completed and returned to MDCH. An additional 209 (7%) postcards were returned as undeliverable; almost all of these were undeliverable because the residence was vacant. 453 (78.1%) of the 580 respondents remembered receiving emergency preparedness information from the local NPP, whereas 21.0% did not believe they had received any preparedness information from the NPP. 0.9% of respondents failed to respond to this item.

Of the 580 respondents, 376 (64.8%) indicated that they had heard about Michigan’s KI distribution program. 198 respondents (34.2%) reported that they had not known or heard about the KI distribution program. 6 respondents (1.0%) did not report an answer for this item.

Of the 580 respondents, 504 (86.9%) reported that they had not gotten KI, 44 (7.6%) stated that they had gotten KI, 29 (5.0%) were unsure as to whether they got KI, and 3 (0.5%) failed to report an answer for this item. Reasons provided for not getting KI follow: didn’t know about the program (32.1%), don’t know (2.4%), forgot to redeem voucher (16.9%), too busy / didn’t get around to it (5.0%), not interested / didn’t feel it was necessary (8.5%), pharmacy location was inconvenient (2.8%), KI would be useless during an emergency event (2.2%), lost or misplaced voucher (4.2%), and other (16.9%). These percentages do not sum to one, as participants were not restricted to a single response.

iv. Geographical Mapping

There did not appear to be a correlation between higher KI coverage percentages and closer living proximities to an NPP for any of Michigan’s three EPZs. Maps displaying the individual KI coverage percentages by census tract for the Palisades, Fermi, and D.C. Cook EPZs may be found in Appendices 9, 10, and 11, respectively.

VI. Discussion

Michigan’s plans to protect the public from a radiation release from its three NPPs, in which evacuation and/or sheltering-in-place are the primary protective actions, have been in place for many years and successfully exercised. The goal of the KI distribution program was to give individuals and businesses within the 10 mile EPZs a choice to supplement existing emergency plans with KI. This evaluation determined that, overall, 5.32% of the 78,000 residences and 5.12% of the population within the EPZs are covered by KI because families chose to do so. Population coverage varied somewhat by NPP: 6.17% for Enrico Fermi, 5.45% for Palisades, and 3.86% for D.C. Cook. The percent of households redeeming vouchers for KI in Michigan was somewhat lower than the 8% household redemption in the first year of Minnesota’s KI program,⁶ which also used a voucher redemption/pharmacy distribution strategy. Also, by comparison, coverage (residential and business) in NJ, which used a series of KI ‘clinics’ to

distribute KI around its two NPPs was less than 5% for one plant and >20% for the other.^{2,7} Some states with distribution programs relying on voluntary visits to KI redemption centers have reported more complete coverage, but their distribution plans have differed, with some using school-based distribution centers, and others staging KI “clinics” in public venues, and greater investments in publicity. Several states have had as their goal that all individuals should have KI available pre-event, and accordingly distributed KI to every household and business through the mail.¹

Given that the goal of the Michigan KI distribution program was providing information so that individuals could make an informed choice about obtaining this supplemental protective measure rather than providing the entire population with KI, we wanted to understand why individuals did or did not take advantage of the offer. Telephone interviewees who had gotten their KI cited the following as reasons most frequently (more than one reason could be given by each respondent): “to be prepared” (57.7%), “to be safe” (18.0%), “it was free” (14.1%), and “because it was recommended” by MDCH (12.8%). Results of telephone interview of voucher non-users showed that 36% said they were not aware of the KI program (in spite of the fact that their household was mailed a voucher) and an additional 12% said they had expected to receive a KI voucher in the mail but failed to receive one. Only 6.7% said they were not interested and 4% said they felt KI was unnecessary. Hence, 48% of interviewed KI voucher non-users did not obtain KI because they did not have sufficient information to decide whether to participate, rather than having the information but choosing not to participate. The results of the postcard survey to an additional sample of individuals who did not redeem vouchers support this conclusion, in that 32% noted they didn’t know about the program.

These findings suggest that our strategy of a bulk mailing accompanied by several weeks of media advertising was not adequate to inform a portion of the population about the availability of KI. Unfortunately it is not possible to determine if there were breakdowns in the delivery of the vouchers due to bulk mailing handling by the postal service, if people did not pay attention to the mailing itself because it appeared to be junk mail, or other reasons. The New Jersey evaluation study reported that effective KI distribution programs require considerable education and outreach components to be effective, and the results of this evaluation are consistent with this assertion.⁷ Different approaches to the voucher mailing and more effective outreach will be needed during future KI distribution campaigns to make sure that all individuals and businesses/institutions receive sufficient information to ensure that they can make an informed choice about whether to obtain KI.

Individuals who had obtained KI were asked several knowledge questions about KI itself, in order to assess their understanding of the drug and its appropriate use. Ninety-seven percent knew where their KI supply was located in their home, but 44% reported that they didn’t know when KI should be taken and 42% did not know that KI effects were only on the thyroid. These findings were similar to findings from the New Jersey KI evaluation study (95% knew where their KI was in their home, but approximately 20% did not know when to take KI, and 30% did not know that KI protects the thyroid).³ These findings indicate that additional efforts are needed to ensure that KI recipients understand when and why they should take KI.

Regarding general emergency preparedness, although 85% of the interviewees remembered receiving the mailing from their NPP with emergency information, almost half (42.5%) of respondents reported they had done “nothing” to prepare for an emergency at the plant. KI voucher non-users reported having done “nothing” far more often than KI voucher users. Further, only 6.5% of interviewees reported having set up a family meeting place, and only 3.9% said they had prepared an emergency kit. This would suggest that the proportion of families with family preparedness plans is even smaller than the national figure of 10% published by the U.S. Department of Homeland Security.⁸ Also notable was that only 20% had developed an evacuation route plan, the primary protective measure that would be put in place during an NPP accident. By comparison, the NJ KI evaluation study found that 52% did not know their evacuation route.³ Telephone interviewees most frequently stated they would tune to a television or radio station (37.3%), evacuate immediately (20.9%), or shelter-in-place (19.0%) if they heard a 3-minute steady siren blast indicating an emergency event had occurred at the NPP. However, 15.7% said they wouldn’t know what to do if faced with such a situation. These responses highlight the need to better educate Michigan EPZ residents on how to prepare for an emergency event at the NPP.

Some study limitations warrant mention. Due to time and financial restrictions, the total sample size (n=153) was rather small in comparison to EPZ denominator populations. Nonetheless, valuable information and insight have been gained from study participants, particularly in regards to the level of emergency preparedness among adult Michigan EPZ residents and how to improve future KI distributions. Another limitation of the study was that KI voucher users and non-users appeared to differ with respect to the percentage of disconnected telephone numbers encountered with each group. 22.6% of the telephone numbers associated with KI voucher non-users ended up being disconnected numbers, whereas only 6.5% of KI voucher users had a disconnected number. This might indicate that KI voucher non-users relocate more often, are more likely to rent than own, or might be of lower socioeconomic status as compared to KI voucher users. Approximately 53% of all telephone interviewees reported that they were retired while only 36% reported that they were currently employed. Self-selection bias, in which retired persons might be more likely to answer the phone or more likely to participate in a telephone survey, might be responsible for this discrepancy. Finally, this study did not include businesses and institutions because of limited resources. Their responses to these questions may have been different, with differing implications for program improvements.

VII. Conclusions and Recommendations

Results gathered from these telephone interviews emphasize the need for improved communications with Michigan residents during future KI distribution campaigns, as 48% of interviewed KI voucher non-users either did not know about the KI distribution program or failed to receive a voucher in the mail. Almost half of all interviewees claimed to have done “nothing” in preparation for any type of emergency event, indicating the need for expanded community promotion of emergency preparedness awareness. Study participants appeared genuinely interested in becoming well-prepared for an emergency event yet seemed to lack the basic know-how to do so.

To address these findings, MDCH, the emergency managers and local health departments for the five counties involved in NPP emergency response, the three NPPs, the Michigan State Police, and the Radiological Protection program and the Michigan Department of Environmental Quality jointly should develop a revised communications plan both for KI and for general NPP emergency preparedness. A variety of options are available, conditional on available resources. To address KI mailing issues, the KI vouchers could be mailed first class rather than bulk mail, allowing confirmation of delivery and reasons for items being undeliverable, or the KI could be incorporated into the NPP annual mailing, which is a document that is more familiar and less likely to be confused with junk mail. To address communication of KI and general NPP emergency information, ideally a media consultant would be hired to review current written materials and dissemination strategies and propose new approaches.

VIII. References

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Potassium Iodide (KI) for People Near Nuclear Power Plants

You received this notice because you live or work near one of Michigan's nuclear power plants. Beginning (date), The State of Michigan is making potassium iodide (KI) available at no cost to people living or working near the plants. In the unlikely event of a serious nuclear power plant accident, KI could provide an extra measure of protection when evacuation is not possible or is delayed. This does not mean that there is more risk of a nuclear accident. Nuclear power plants are safer than ever.

What is KI?

KI (the chemical name for the drug "potassium iodide") is a small iodine pill. Iodine helps your body work well, which is why it is often added to table salt. The iodine in this pill is much stronger than the iodine in the table salt you put on your food. It is also very different from the liquid iodine you can put on scrapes or cuts.

Why do you need to know about KI?

The chance of an accident at a nuclear power plant is very small. But a serious accident could cause radiation to escape from the plant. One form of radiation, radioactive iodine, could harm your thyroid gland. KI can be taken to protect your thyroid gland from this kind of radiation.

How does KI work?

Iodine is stored and used by the thyroid gland. Radioactive iodine released during a nuclear power plant accident can also be stored in the thyroid. This can cause thyroid cancer or other thyroid problems over time. KI protects your thyroid by filling it up with a safe form of iodine so that it can't take in radioactive iodine. It is important for you to know that KI does not protect your whole body from radioactive material. KI only protects your thyroid gland.

Who should not take KI?

You should not take KI if:

- You are allergic to iodine. (Note: A shellfish allergy may not mean that you are allergic to iodine.)
- You have dermatitis herpetiformis or hypocomplementemic urticarial vasculitis (two very rare skin conditions)
- If you already have a thyroid condition, you should talk to your doctor about taking KI. If you are unsure whether or not to take KI, talk to your doctor.

Where can you get KI?

To get your free KI supply for your family, take the voucher that on the back of this form to one of the pharmacies listed. Keep it with your family's disaster supply kit, and take it only when told to by emergency officials. (Note: You can buy KI on the Internet instead, if you want. You do not need a prescription.)

To obtain KI for your business or institution, attend one of the KI distribution forums being held at various locations in (month) (see chart). Starting (date) businesses and institutions can pick up their KI supplies from one of the participating pharmacies by bringing in a completed voucher.

Where can you get more information?

Michigan Department
of Community Health



If you have any questions or concerns, contact the Michigan Department of Community Health at 1-800-648-6868 or visit our website at <http://www.michigan.gov/KI>.

Appendix 1: KI Mailing & Voucher

KI (Potassium Iodide) for Households

To get KI for the people living in your home, fill out this form and take it to one of the Meijer stores listed at the bottom. You must be 18 years or older, provide a photo ID and bring this form to get your KI.

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____

County: _____

How many people living in your home are:

Write the number here.

Adults over age 18?

Children ages 2 to 18 who weigh 150 pounds or more?

Children ages 0 to 18 who weigh less than 150 pounds?

Complete this chart to find out how much KI you will need:

Please read the information on the front and back of this form before signing below. Signing below means that you agree to and understand the following:

- I have read all of the information given to me about KI.
- I know that I am not required to pick up KI from Meijer or to use it.
- I will take KI and give it to others in my family only when instructed to by emergency officials.
- KI is NOT a substitute for evacuation. Leaving the area is often the best way to protect my health and that of my family in the event of a radiological emergency.
- I am responsible for following the instructions on how to use KI.
- I will replace our KI tablets when they expire (the date will be marked on the package).
- I understand that KI only protects the thyroid gland from radioactive iodine. In a nuclear emergency, my health could still be at risk from other types of nuclear radiation.
- Although taking KI is usually safe, I understand it can cause problems in people who have had troubles with their

thyroid, allergies to iodine or shellfish, or certain serious skin rashes. If you or others living in your home have had

any of these issues or are not sure, please talk to a doctor before taking KI.

- I will hold Meijer, Inc. harmless from all liability, claims, suits and actions related to the use, delivery, labeling and packaging of KI.
- This KI program is run by the Michigan Department of Community Health. If I have questions, I can call them at 1-800-648-6942.

Meijer Pharmacies

Benton Harbor - 1920 Pipestone Road

Monroe - 1700 Telegraph Road

Michigan City, Indiana - 5150 S. Franklin Street

Your Signature _____

Date

Pharmacy use only: Amount dispensed _____ Lot # _____ Date _____ Appendix 2: EPZ Demographics

All of the following demographic estimates were obtained from the U.S. Census Bureau. The reported racial and income demographic estimates were released by the U.S. Census Bureau in 2008. The reported educational and language demographic estimates were published by the U.S. Census Bureau in 2000.

Enrico Fermi Power Plant

The EPZ associated with Enrico Fermi, located in Newport, Michigan, primarily spans Monroe County, and also includes portions of Wayne County. This EPZ contains roughly 42,330 residences and 2,500 businesses. Monroe County has a higher percentage of white residents (95.3%) than Michigan's overall demographic profile indicates (81.2%). 2.4% of Monroe County residents are black, whereas 14.2% of the total Michigan population is black. 0.7% of Monroe County residents are Asian, an estimate lower than that for the state of Michigan (2.4%). 83.1% of Monroe County residents have reached at least a high school education level, a figure comparable to Michigan's overall estimate of 83.4%.

Additionally, only 14.3% of Monroe County residents have earned a bachelor degree or higher, a percentage far less than that for the state of Michigan (24.4%). 4.0% of Monroe County residents speak a language other than English at home, whereas this estimate jumps to 8.4% for the state of Michigan. Additionally, the median household income estimate for Monroe County residents was \$57,539 in 2008, an income substantially higher than the average median household income for the state of Michigan (\$48,606). Monroe County has the highest median household income of the five counties included within Michigan's three EPZs. Only 10.1% of Monroe County residents live below the poverty level, whereas 14.4% of all Michigan residents live below the poverty level.

Wayne County residents exhibit the following racial demographic: 54.8% white, 40.9% black, and 2.4% Asian. A language other than English is spoken in 10.8% of homes in Wayne

County, compared to an 8.4% state average. 77.0% of Wayne County residents have attained at least a high school education, and 17.2% have achieved a college bachelor's degree or higher. The median household income for Wayne County was \$42,463 in 2008, a figure far lower than Michigan's \$48,606 average. Wayne County has the lowest median household income of all of Michigan's EPZ counties. 20.5% of Wayne County residents live below the poverty level. Overall, Wayne County demographics vary drastically from those of Michigan's other four EPZ counties. It should be noted that metropolitan Detroit is located in Wayne County, but does not lie within the Enrico Fermi EPZ.

Appendix 2: EPZ Demographics

Palisades Power Plant

The EPZ associated with the Palisades plant, located in Covert, Michigan, covers areas of both Van Buren and Allegan Counties. This EPZ includes about 14,630 residences and 900 businesses. The largest portion of this EPZ is contained within the borders of Van Buren County. 92.1% of Van Buren County residents are white, 4.6% are black, and 0.4% are Asian. 78.9% of Van Buren County residents have completed high school, whereas 14.3% have attained a college bachelor's degree or higher. 8.9% of Van Buren County residents speak a language other than English at home. The 2008 median household income estimate for Van Buren County was \$43,702. 15.0% of Van Buren County residents live below the poverty line.

Allegan County residents exhibit the following racial demographic: 96.1% white, 1.5% black, and 0.7% Asian. 6.8% of Allegan County residents speak a language other than English at home. 82.3% of residents have graduated from high school and 15.8% of residents have earned a college degree or higher. For Allegan County residents, the 2008 median household income estimate was \$49,784. 11.5% of Allegan County residents live below the poverty line.

Donald C. Cook Power Plant

The EPZ surrounding the Donald C. Cook nuclear power plant, located in Bridgman, Michigan, includes portions of Berrien County. This 10-mile radius covers approximately 21,540 residences and 1,300 businesses. 81.9% of Berrien County residents are white, 14.6% are black, and 1.5% are Asian. This composition closely mirrors that of the state of Michigan. 7.1% of Berrien County residents speak a language other than English at home. 81.9% have achieved an education level of high school or higher, while 19.6% have earned a bachelor's degree or higher. The educational profile of Berrien County is very similar to that of the state of Michigan. For Berrien County residents, the 2008 median household income was \$42,905, a value lower than Michigan's average of \$48,606. 17.5% of Berrien County residents live below the poverty line.

Source:

U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, Census of Population and Housing, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business

Appendix 3: Telephone Survey

ated Federal Funds Report. Last Revised: Thursday, 22 Apr 2010

STUDY ID: _____

08.22.02 EDI

**AN EVALUATION STUDY OF MICHIGAN'S PUBLIC POTASSIUM IODIDE
(KI) DISTRIBUTION PROGRAM**

PHONE NUMBER: _____

DATE:

POWER PLANT: _____

TIME:

Hello, is [_____] available please? Hi. My name is [_____]. I'm calling from the Michigan Department of Community Health in Lansing. The reason for my call is that the state health department needs some help to improve emergency plans around the [Plant Name] in your area. I was wondering if you'd be willing to answer a few short questions to help us out? The questions usually take less than 5 minutes to answer.

A) Are you 18 years of age or older?

If YES → (Continue on to next question.)

If NO → Is there an adult that I may speak with?

If YES → Repeat the above introduction.

If NO → Unfortunately, residents under the age of 18 are not eligible to participate in this

study.

Thank you for your time and interest.

B) Were you living at this address prior to October 1, 2009?

If YES → (Continue with consenting process.)

If NO → Unfortunately, if you have not lived at this residence prior to October 1, 2009, you are ineligible

for study participation. Thank you for your time and interest.

If desired:

Your answers to the following questions will help us do a better job in the future of getting important safety information to the public living or working around the [Plant Name] nuclear power plant in your community. Your responses will be completely confidential. You do not have to answer any question you do not want to, and you may end the interview at any time. If you have any questions about this survey, please call Martha Stanbury at the Michigan Department of Community Health at 517-335-8350.

General Emergency Preparedness

First, I'm going to ask you a few questions about preparing for an emergency around the [Plant Name] nuclear power plant.

1) Do you live within 10 miles of the [Plant Name] nuclear power plant?

- ₁ Yes
- ₂ No
- ₃ Don't know

2) Do you remember receiving a booklet in the mail from the nuclear power plant providing information on emergency preparedness? This booklet would have contained instructions on what to do if a radiological emergency ever occurred at the plant.

- ₁ Yes
- ₂ No *(Skip to **QUESTION 4.**)*
- ₃ Maybe *(Skip to **QUESTION 4.**)*

3) Do you know where this booklet is right now?

Appendix 3: Telephone Survey

STUDY ID: _____

- ₂ NO *(Skip to **QUESTION 4.**)*
- ₃ Maybe *(Skip to **QUESTION 4.**)*

4) What have you or other household members done, if anything, to prepare for an emergency event at the nuclear power plant?

(Do not read list. Record all provided answers.)

- ₁ Planned evacuation route
- ₂ Purchased extra supply of food
- ₃ Purchased extra supply of water
- ₄ Prepared an emergency kit
- ₅ Set up a family meeting place
- ₆ Got potassium iodide (KI) pills
- ₇ Read preparedness information provided by plant
- ₈ Keep gar fully fueled
- ₉ Nothing
- ₁₀ Other → Specify:

5) What would you do if you were at home and heard a 3-minute steady siren blast?

(Do not read list. Record all provided answers.)

- ₁ Tune radio or television to the Emergency Alert System
- ₂ Shelter in place
- ₃ Evacuate
- ₄ Contact/Check with family/neighbors
- ₅ Call police

- 6 Shut all windows/doors
 - 7 Read plant mailing for information
 - 8 Don't know
 - 9 Other → Specify:
-

KI Voucher Use

Now I'm going to ask you a few questions about the potassium iodide distribution program set up by the state health department last fall. This program allowed people to go to specified pharmacies to get a free supply of potassium iodide tablets (KI), an anti-radiation medication.

6) Did you hear about this potassium iodide (KI) public distribution program?

- 1 Yes
- 2 No *(Skip to **QUESTION 14.**)*
- 3 Maybe *(Skip to **QUESTION 14.**)*

7) Do you remember receiving information about potassium iodide (KI) tablets in the mail or on the news last fall?

- 1 Yes
- 2 No *(Skip to **QUESTION 14.**)*
- 3 Maybe

8) Do you recall specifically how you learned about the free potassium iodide (KI) tablet distribution program?

(Do not read responses. Record all provided responses).

- 1 Mailing from state health department
- 2 Newspaper
- 3 Television
- 4 Internet
- 5 Word of mouth (friends, neighbors, etc.)
- 6 Town meeting

Appendix 3: Telephone Survey

STUDY ID: _____

- 9 Other → Specify:
-

9) Did you or one of your family members go to get the free KI tablets?

- 1 Yes *(Skip to **QUESTION 10 A.**)*
- 2 No *(Skip to **QUESTION 13.**)*
- 3 Don't know *(Skip to **QUESTION 14.**)*

10) (a) Why did you decide to go and get the potassium iodide (KI) tablets?

(Do not read list. Record all provided reasons.)

- 1 To be prepared
 - 2 To be safe / To keep family safe
 - 3 "It was recommended" / "Told to do so"
 - 4 Close proximity of residence to plant
 - 5 Concerned about plant safety
 - 6 The potassium iodide (KI) was free
 - 7 Other → Specify:
-

(b) Do you know where the potassium iodide (KI) tablets are stored in your house right now?

- 1 Yes (Skip to **QUESTION 12.**)
- 2 No (Proceed to **QUESTION 10C.**)
- 3 Maybe (Proceed to **QUESTION 10C.**)

(c) What would you do if you were instructed to evacuate your home during an emergency at the power plant

and couldn't find your KI tablets?

(Do not read list. Check all provided responses).

- 1 Evacuate immediately
- 2 Don't Know
- 3 Other → Specify:

SKIP TO QUESTION 12.

11) What part of the body does KI protect from radiation? *I'll read a list of choices for you to choose from.*

- 1 Entire body
- 2 Brain
- 3 Thyroid
- 4 Heart
- 5 Don't know

12) What is your understanding of when KI should be taken to work effectively?

(Do not read list. Check all provided responses.)

- 1 As soon as instructed
- 2 When the sirens begin to sounds
- 3 Would consult plant booklet/calendar
- 4 Would consult KI box direction insert
- 5 Don't know
- 6 Other → Specify:

Appendix 3: Telephone Survey

STUDY ID: _____

13) Why did you and your household decide not to get the KI tablets?

(Do not read list. Record all provided reasons).

- 1 Didn't know about the program
- 2 Didn't receive voucher in the mail
- 3 Lost / Mislplaced voucher
- 4 Felt potassium iodide (KI) tablets were unnecessary
- 5 Wasn't interested
- 6 Didn't get around to it / Too busy
- 7 Forgot about it
- 8 Don't know

Demographics

Finally, I'd like to gather some information about you and your household.

14) What is your age in years?

- 15) Indicate sex of respondent.
(Only ask this question if necessary.)

- ₁ Male
 ₂ Female

- 16) Are you...?
(Read all options in list.)

- ₁ Married
 ₂ Separated
 ₃ Divorced
 ₄ Widowed
 ₅ Never married
 ₆ Member of an unmarried couple

- 17) What is the highest grade or year of school you completed?
(Do not read list.)

- ₁ Never attended school or only attended kindergarten
 ₂ Elementary school (Grades 1 through 8)
 ₃ Some high school (Grades 9 through 11)
 ₄ High school graduate (Grade 12 or GED)
 ₅ Some college or technical school (1 to 3 years of college)
 ₆ College graduate (4 years of college)
 ₇ Other → Specify:
-

- 18) What is your current employment status?
(Do not read options in list. Complete question based on provided answer.)

- ₁ Employed for wages
 ₂ Self-employed
 ₃ Out of work for more than 1 year
 ₄ Out of work for less than 1 year
 ₅ Homemaker

Appendix 3: Telephone Survey

STUDY ID: _____

- ₈ Unable to work

- 19) How long have you lived at your current address?

_____ Years _____ Months

- 20) (a) How many adults and how many children currently live in your household?

_____ Adults _____ Children



(If more than one adult, proceed to **QUESTION 20b.**)

- (b) Do you consider yourself to be the head of household?

- ₁ Yes
 ₂ No
 ₃ Yes, but share with someone (e.g. spouse)

- 21) Which one of the following groups would you say best represents your race?
(Read all options in list.)

- ₁ White or Caucasian
- ₂ Black or African American
- ₃ Asian
- ₄ Native Hawaiian or Other Pacific Islander
- ₅ American Indian or Alaska Native
- ₆ Other → Specify: _____

22) Are you Hispanic or Latino?

- ₁ Yes
- ₂ No
- ₃ Don't know

23) (a) Is English the primary language spoken in your home?

- ₁ Yes
- ₂ No (Continue to **QUESTION 23b.**)

↓

What is the primary language spoken in your home?

- ₃ Split evenly between English and another language

↓

What is the other language?

End of interview.

Thanks for your time and have a great day!

Appendix 5: Answering Machine Dialog

Hello, my name is [], and I'm calling from the Michigan Department of Community Health in Lansing. We need your help in improving emergency plans to protect people who live or work around the [Fermi, Palisades, OR Cook] nuclear power plant. Your telephone number was chosen at random from addresses of households located near this plant. I'd like to ask you some questions about emergency planning and the power plant. Your answers will help us do a better job in the future of getting important safety information to the public living or working around the nuclear power plant in your community. If you are interesting in participating in this survey or have any questions, please call me at [phone number] or email me at [email address]. Thank you for your time and have a pleasant day.

Appendix 6: Fermi Plant Mailing

Dear Resident:

The Michigan Department of Community Health (MDCH) **needs your help** in improving emergency plans to protect the people who live or work around the Fermi 2 Power Plant. Your address was chosen at random from a list of residences located near this power plant.

The following questionnaire will **take less than five minutes** to complete and will provide MDCH with important information on how to better serve the emergency preparedness needs of your community. Your responses are very important to MDCH. Please answer the questions, detach the questionnaire along the perforated line, and drop it off in the mail. The questionnaire has been pre-stamped for your convenience.

If you have **any questions about this questionnaire**, please call Martha Stanbury at (517) 335-8350. Thank you for your time and cooperation. We appreciate your help in better serving you!

Please detach and mail the following portion.

Perforated

- 1) Do you remember receiving a booklet in the mail from the Fermi 2 Power Plant? This booklet gave information about emergency plans for people living around the plant.
- Yes No
- 2) Do you remember receiving information about potassium iodide in the mail or hearing about it on the news last fall? (Potassium iodide is also known as KI.) This information explained how you could go to a pharmacy to get a free supply of potassium iodide tablets.
- Yes No
- 3) Did you or one of your household members go to the pharmacy to get the potassium iodide tablets?
- Yes
- No, because _____
- _____
- Don't know

Appendix 6: Fermi Plant Mailing

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Postage Paid Return Endorsement

To: Martha Stanbury
 Division of Environmental Health
 Michigan Department of Community Health

P.O. Box 30195
Lansing, MI 48909

Appendix 7: Palisades Plant Mailing

Dear Resident:

The Michigan Department of Community Health (MDCH) **needs your help** in improving emergency plans to protect the people who live or work around the Palisades Power Plant. Your address was chosen at random from a list of residences located near this power plant.

The following questionnaire will **take less than five minutes** to complete and will provide MDCH with important information on how to better serve the emergency preparedness needs of your community. Your responses are very important to MDCH. Please answer the questions, detach the questionnaire along the perforated line, and drop it off in the mail. The questionnaire has been pre-stamped for your convenience.

If you have **any questions about this questionnaire**, please call Martha Stanbury at (517) 335-8350. Thank you for your time and cooperation. We appreciate your help in better serving you!

Please detach and mail the following portion.

Perforated

- 1) Do you remember receiving a booklet in the mail from the Palisades Power Plant? This booklet gave information about emergency plans for people living around the plant.

Yes No

- 2) Do you remember receiving information about potassium iodide in the mail or hearing about it on the news last fall? (Potassium iodide is also known as KI). This information explained how you could go to a pharmacy to get a free supply of potassium iodide tablets.

Yes No

- 3) Did you or one of your household members go to the pharmacy to get the potassium iodide tablets?

Yes
 No, because _____

 Don't know

Appendix 7: Palisades Plant Mailing

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Postage Paid Return Endorsement

To: Martha Stanbury
Division of Environmental Health
Michigan Department of Community Health
P.O. Box 30195
Lansing, MI 48909

Appendix 8: Cook Plant Mailing

Dear Resident:

The Michigan Department of Community Health (MDCH) **needs your help** in improving emergency plans to protect the people who live or work around the Cook Nuclear Plant. Your address was chosen at random from a list of residences located near this power plant.

The following questionnaire will **take less than five minutes** to complete and will provide MDCH with important information on how to better serve the emergency preparedness needs of your community. Your responses are very important to MDCH. Please answer the questions, detach the questionnaire along the perforated line, and drop it off in the mail. The questionnaire has been pre-stamped for your convenience.

If you have **any questions about this questionnaire**, please call Martha Stanbury at (517) 335-8350. Thank you for your time and cooperation. We appreciate your help in better serving you!

Please detach and mail the following portion.

Perforated

- 1) Do you remember receiving a calendar in the mail from the Cook Nuclear Plant? This calendar gave information about emergency plans for people living around the plant.
 Yes No

- 2) Do you remember receiving information about potassium iodide in the mail or hearing about it on the news last fall? (Potassium iodide is also known as KI.) This information explained how you could go to a pharmacy to get a free supply of potassium iodide tablets.
 Yes No

- 3) Did you or one of your household members go to the pharmacy to get the potassium iodide tablets?
 Yes

- No, because _____

- Don't know

Appendix 8: Cook Plant Mailing

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Postage Paid Return Endorsement

To: Martha Stanbury
Division of Environmental Health
Michigan Department of Community Health
P.O. Box 30195
Lansing, MI 48909