Closeout for M97020004

This case was brought to the attention of OIG [redacted] January 1997. A program manager[1] provided our office with a letter she had received from a scientist.[2] The letter described allegations of fabrication against a graduate student[3] and the university's actions to resolve the matter.

OIG's investigation report and NSF's Deputy Director's 9 February 1999 letter describing his decision constitute the closeout for this case.

Cc: Integrity, IG

[1] Dr. [redacted], program director for the [redacted] Program in the Division of [redacted] in the Directorate for [redacted]

[2] The scientist was Dr. [redacted], the [redacted] Professor of [redacted] at the University of [redacted]

[3] Ms. [redacted]

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230

OFFICE OF THE
DEPUTY DIRECTOR

February 9, 1999

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Ms. [redacted]

Re: Notice of Misconduct in Science Determination

Dear Ms. [redacted]

The National Science Foundation's Office of Inspector General (OIG) issued an Investigative Report on October 1, 1998 in which it concluded that you fabricated research data in your Ph.D. thesis. A copy of the OIG investigative report is enclosed.

Misconduct in Science and Proposed Sanctions

Under the National Science Foundation's (NSF) regulations, "misconduct" is defined to include "fabrication, falsification, plagiarism, or other serious deviation from accepted practices in proposing, carrying out, or reporting results from activities funded by NSF." 45 CFR. §689.1(a).

The Foundation's administrative record indicates that you were formerly a doctoral student in the [redacted] Department at the University of [redacted]. While at the University, you submitted a thesis to obtain your Ph.D. Your thesis research was supported in part by an NSF award to your adviser, Professor [redacted] (NSF Grant No. [redacted], entitled "[redacted]").

In 1996, allegations arose that the measurements in two chapters of your thesis were fabricated. A University Committee investigated the allegations and concluded that you fabricated research data by cutting and pasting [redacted] to eliminate actual data and add new [redacted] features (Exhibit 1A). The Committee concluded that "the heart of [the] dissertation [was] based on fraudulent data" and it found "a very clear pattern that undermines the entire basis for the research reported in the dissertation." (Exhibit 1A). You did not contest the majority of the allegations and withdrew your thesis. The University rescinded your Ph.D. degree in February of 1997. The University also took additional measures to notify the appropriate institutions of the research fabrication.

NSF's Office of Inspector General conducted its own investigation and agrees with the Committee that you fabricated research data. OIG concludes that you deliberately fabricated the data and that you committed a serious deviation from accepted practices.

I concur with the Committee and the OIG's conclusion that you fabricated data in your Ph.D. thesis. The record demonstrates that you deliberately fabricated the data by cutting and pasting spectra. Your fabrication of significant research data in your Ph.D. thesis is a serious deviation from accepted practices within the scientific community. I conclude that you committed misconduct in science.

In deciding what action is appropriate to take in response to the finding of misconduct in science, NSF has considered the seriousness of the misconduct, whether it was deliberate or careless; whether it was an isolated event or part of a pattern; and whether the misconduct affects only certain funding requests or has implications for any application for funding involving the subject of the misconduct finding. See 45 C.F.R. §689.2(b).

I am issuing this finding of misconduct in science and letter of reprimand to express strong disapproval of your conduct in this matter. Research fabrication is a serious offense because it distorts the scientific record. The scientific record is the foundation for all scientific research.

In determining the appropriate sanction, however, I conclude that further action is not necessary to protect the Government's interest because the University took numerous steps to address the fabrication and you have advised NSF that you have not worked in the field of [redacted] since you forfeited your degree.

Nevertheless, if you submit any research proposals or reports to NSF or report on the results of NSF-supported research within three years from the date of this letter, you must submit a separate certification to NSF's OIG. The written certification shall state that to the best of your knowledge, the documents contain no fabricated or falsified data. The certification should be sent to the Associate Inspector General for Scientific Integrity, 4201 Wilson Boulevard, Arlington, Virginia, 22230, at the same time that you submit the research proposal or report to NSF or report the results of NSF-funded research. In addition, the supervisor or principal investigator of the project must also submit an assurance to the OIG that to the best of his or her knowledge, your research proposal or report submitted to NSF, or report of results from NSF-funded research does not contain any falsified or fabricated data.

Procedures Governing Appeals

Under NSF's regulations, you have 30 days after receipt of this letter to submit an appeal of this decision, in writing, to the Director of the Foundation. 45 CFR §689.9(a). Any appeal should

be addressed to the Director at the National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230. For your information we are attaching a copy of the applicable regulations. If you have an questions about the foregoing, please call Lawrence Rudolph, General Counsel, at (703) 306-1060.

Sincerely,

Joseph Bordogna
Acting Deputy Director

Enclosures (2)
Misconduct in Science Regulations
Investigative Report

Confidential

Office of Inspector General

Investigation Report

OIG Case M97020004

1 October 1998

REPORT OF INVESTIGATION INTO AN ALLEGATION OF MISCONDUCT IN SCIENCE AND ENGINEERING

SUMMARY

The Office of Inspector General (OIG) has determined that [redacted] (the subject), formerly a graduate student at the University of [redacted] (the institution), fabricated data in her Ph.D. thesis. This conclusion is based on investigations by the institution and OIG. OIG recommends that NSF make a finding of misconduct in science and send the subject a letter of reprimand notifying her that NSF has made that finding.

BACKGROUND

The subject received her Ph.D. in [redacted] from the institution on [redacted] Her thesis research was supported in part by an NSF award.[1] After she left the institution, she asked another student to bring her a box that she had left behind in her Ph.D. advisor's laboratory. A postdoctoral student, who had been attempting without success to reproduce the subject's measurements, discovered evidence of fabricated research data in the box.[2] The evidence was reviewed by the [redacted] (the Committee) and forwarded to the [redacted] (Associate Dean).[3] The subject did not contest the majority of the allegations of fabrication against her, and as a result, returned her Ph.D. degree and withdrew her thesis. The subject also apologized to the College of Arts and Sciences, the [redacted] Department, and her Ph.D. advisor.[4] The subject's degree was rescinded by the institution on [redacted].

The subject's Ph.D. advisor informed his NSF program officer about the matter and, at the program officer's request, summarized the incident and the institution's response in a letter. That letter was forwarded to OIG at the request of the institution.[5]

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[1] [redacted]. The subject's Ph.D. advisor was the sole PI.

[2] The subject's ownership of the box and of the evidence of fabrication found within it is not disputed. Letter from the subject to Associate Dean at 1 (1 October 1996) (exhibit 1C); letter from the subject's Ph.D. advisor to Chair of the Committee at 1 (25 June 1996) (exhibit 1B).

[3] Letter from Committee to Associate Dean (25 June 1996) (exhibit 1A).

[4] Letter from the subject to Associate Dean at 2 (1 October 1996) (exhibit 1C).

[5] The letter, dated 15 November 1996, was forwarded to OIG on 24 January 1997. Pursuant to a subpoena issued 25 March 1997, OIG requested and obtained copies of documents relating to the institution's investigation into and actions taken in response to the allegation that the subject had fabricated data in the course of her thesis research. During the course of reviewing the material provided by the institution, OIG requested and received additional documents: on 5 June 1998, a copy of the subject's thesis and, on 20 August 1998, the original documents that were attached to the 25 June 1996 letter from the subject's Ph.D. advisor to the Chair of the Committee.

THE INSTITUTION'S INVESTIGATION

According to the subject's Ph.D. advisor, chapter two of the thesis reported the results of the subject's independent research, an investigation of catalyzed[6] hydrogenation of three substrates[7] using three different methods: [redacted] analyses, and [redacted] determinations. The Ph.D. advisor alleged that each of the three types of measurements presented in chapter two of the thesis were fabricated.[8] None of these measurements were published.[9] The subject's Ph.D. advisor also alleged that one measurement in chapter three of the subject's thesis was fabricated and that this fabricated measurement was published.[10]

The Committee that reviewed the evidence of fabrication was composed of five faculty members from the Department of [redacted]. The Committee recommended that the subject's Ph.D. degree be rescinded.

The Committee explained that in their review of the case:

> [The Committee] learned that the key chapter of the dissertation[, chapter two,] involved essentially three kinds of measurements . . . . A thorough review of the results of this chapter revealed that [redacted] reported in the thesis had been altered through cutting and pasting to eliminate actual data and add new spectral features where none appeared in authentic spectra. Fabrication of [redacted] spectral results was also found in a second chapter[, chapter three,] that has been published.

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[6]The catalyst is [redacted].

[7]The three substrates were [redacted].

[8]Letter from the subject's Ph.D. advisor to Chair of the Committee at 1 (25 June 1996) (exhibit 1B). Chapter two of the thesis also included a study of the kinetics of one of the [redacted] reactions. The subject's Ph.D. advisor also alleged that some [redacted] spectra with no thesis counterparts were fabricated and used to make presentation overheads illustrating how the kinetics of [redacted] were followed. *Id.* at 1-2. Evidence of this fabrication from the box the subject left behind is available for review in our administrative record. The subject did not contest the allegation that the [redacted] were fabricated. Letter from the subject to Associate Dean at 1 (1 October 1996) (exhibit 1C).

[9]The work was mentioned in a lecture given by the Ph.D. advisor at several [redacted] universities [redacted], and a paper based on the lecture was published. [redacted] The paper acknowledges NSF support.

[10]The allegedly fabricated data were published as figure 3(d) in the [redacted] at [redacted] Figure 3d was retracted and the paper corrected. [redacted]. The same figure also appears as figure 10(d) in a second paper. [redacted] *supra* note 9 at 479. The author informed OIG that this paper will be corrected.

> The rest of the work in that chapter was carried out by [a collaborator] and is in order. Our review leads us to the very clear conclusion that the heart of [the subject's] dissertation is based on fraudulent data. These instances are not isolated, but constitute a very clear pattern that undermines the entire basis for the research reported in the dissertation.[11]

The Associate Dean notified the subject of the allegations against her, and after discussing the allegations with her Ph.D. advisor,[12] the subject called the Associate Dean. The subject told him that she had decided to return her Ph.D. thesis and degree to the institution, and requested a copy of her Ph.D. advisor's letter detailing the allegations. The Associate Dean provided the requested document and asked the subject to respond to each of the allegations.[13]

In her response to the Associate Dean, the subject did not contest her Ph.D. advisor's allegations that spectra for [redacted] determinations and [redacted] analyses reported in chapter two of her thesis were fabricated. The subject did, however, contest the allegations concerning the [redacted] measurements reported in chapters two and three of her thesis. In the last paragraph of her response, the subject said:

> In conclusion, I will not contest the majority of charges filed against me by [my Ph.D. advisor] regarding [c]hapters [t]wo and [t]hree of my Ph.D. [t]hesis. As a result, I am returning the degree of Doctor of Philosophy to the [institution] and withdrawing my thesis from the College of Arts and Sciences. I look forward to putting this incident behind [me] and wish to thank you personally for all the help and guidance you have given me during the recent events. I apologize to the college of Arts and Sciences, the [redacted] Department, and to [my Ph.D. advisor] for tarnishing the reputation of the [institution].[14]

THE INSTITUTION'S ACTION

The institution rescinded the subject's Ph.D. degree on [redacted]. The institution's registrar also took steps to ensure that all transcripts issued for the subject would include a letter stating: "To Whom It May Concern: This student's degree was revoked for academic disciplinary reasons. Questions regarding this student may be directed to the office of the Dean of The College."[15]

On [redacted], the Vice Provost for Research and Graduate Affairs (Vice Provost) sent a memorandum to the institution's administrators, the Chair of the Department of [redacted] and members of the subject's dissertation committee informing them of the rescission of the subject's Ph.D. degree. The memorandum

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[11]Letter from Committee to Associate Dean at 1 (25 June 1996) (exhibit 1A)
[12]The subject discussed the allegations with her Ph.D. advisor after the [redacted] Meeting, which was held at the University of [redacted] during the week of [redacted].
[13]Letter from Associate Dean to the subject (16 August 1996).
[14]Letter from the subject to Associate Dean at 2 (1 October 1996) (exhibit 1C).
[15]Memorandum from University Registrar to Vice Provost (12 March 1997).

directed that, if a letter of recommendation had been written on behalf of the subject, or if any organization had been contacted about the award of the subject's Ph.D., each person and organization previously contacted should be notified that the subject's degree had been rescinded. [16] The Vice Provost also formally notified all organizations that had been informed of the institution's conferral of the subject's degree that the degree had been rescinded. The Provost notified the president of the university where the subject had taught of the rescission of her degree.[17] The Provost informed the subject of the institution's action rescinding her degree and of the notifications of that action sent by the institution to specific individuals and organizations.[18]

OIG'S INVESTIGATION

OIG obtained from the institution copies of documents relating to the subject, including the subject's student records, and copies of documents relating to the institution's investigation into and actions taken in response to the allegation that the subject had fabricated data in the course of her thesis research. OIG also obtained original documents from the box left behind by the subject.[19] On 26 August 1998, OIG sent the subject copies of documents obtained from the institution and asked for her comments on the allegations and any additional information she wanted to provide. The subject said:

> My official response regarding the specifics of allegations of data fabrication in the course of my doctoral research was outlined in my letter to [the Associate Dean] [of 1] October 1996. Thus, I will not restate it here other than to say I did not contest the majority of charges when presented to me by [my Ph.D. advisor] and do not now. I would, however, like to take this opportunity to express my deep regret for the situation, *I alone*, have created. After much reflection, I am truly ashamed of my actions which have tarnished the reputation of a professor, a department, and a university along with breaching the trust of those closest to me.[20]

OIG'S ANALYSIS

NSF defines "misconduct in science," in pertinent part as "fabrication, falsification, plagiarism, or other serious deviation from accepted practices in proposing, carrying out, or reporting results from activities funded by NSF."[21] The subject in this case was a graduate student, who received a stipend from her Ph.D. advisor's NSF award during the course of her thesis research. Her research supplies and expendables were

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[16]Memorandum from Vice Provost to Acting Dean of The College, Associate Dean, Chair of the Department of [redacted] the subject's Ph.D. advisor, and members of the subject's dissertation committee (5 March 1997).

[17]Letter from Provost to President of [redacted] University (5 March 1997).

[18]Letter from Provost to the subject (19 March 1997).

[19]These documents were attached to the 25 June 1996 letter (exhibit 1B) from the subject's Ph.D. advisor.

[20]Letter from the subject to OIG (1 September 1998) (emphasis in original) (exhibit 1D).

[21]45 C.F.R. § 689.2(a)(1).

charged to that award. There can be no doubt that fabrications that undermine the basis for research reported in a graduate student's thesis and lead the student to accede to the rescission of a conferred Ph.D. degree are a serious deviation from accepted practices and, therefore, misconduct in science under NSF's regulation.

Below, we present the evidence that supports our conclusion that the [redacted] determinations, [redacted] spectra, and [redacted] analyses were fabricated.

Fabricated [redacted] Determinations in Thesis Chapter Two

High pressure liquid chromatography (HPLC) is used to separate multiple chemical compounds that are dissolved in solution. HPLC instruments consist of a reservoir of solution, a pump, an injector, a separation column, and a detector. The compounds in solution are separated by injecting a sample from the reservoir onto the column. The different compounds in solution pass through the column at different rates, and the detector records the different compounds as they come out of the column. HPLC instruments produce chromatograms, graphs[22] showing the compounds coming off the column over time; the peaks on the chromatograms correspond to the retention times, the time at which each different compound comes out of the column.

Exhibits 2A, 3A, and 4A are figures 2.15, 2.16, and 2.17 from chapter two of the subject's thesis. These figures are HPLC chromatograms that purportedly demonstrate [redacted] determinations for certain chemical reactions. Exhibits 2B, 3B, and 4B are copies of documents from the box left behind by the subject that demonstrate that the subject fabricated these HPLC chromatograms for her thesis.[23] In the chromatograms of exhibits 2B, 3B, and 4B, cutting and taping is apparent in the graphs and in the numbers below the graphs. The graphs in these chromatograms are composed of several small pieces of paper taped together. The pieces of paper have been carefully matched at the edges so that the resulting graph appears to be a single continuous line.

The shapes of the graphs in the chromatograms of thesis figures 2.15, 2.16, and 2.17 are identical to the shapes of the graphs in the cut-and-taped chromatograms, although some of the numbers (graph labels and numbers below the graphs) in the thesis figures are not the same as in the cut-and-taped chromatograms. The identical shapes of the graphs are significant because random features in chromatograms, such as noise on a graph's baseline, will not be the same in two different chromatograms—even in two chromatograms produced by repeating exactly the same analysis. If the same random features occur in the shapes of the graphs in two chromatograms then the same graph was used in both. The peaks on the graphs in the cut-and-taped chromatograms are identical

[22]The vertical axis on these graphs is time (increasing from top to bottom).

[23]Two copies of each document are included in exhibits 2B, 3B, and 4B: the first copy was made with enhanced contrast, and the second, with normal contrast. The enhanced-contrast copies of these documents allow the cutting and taping in the original documents, which are available for review in our administrative record, to show clearly in the copies attached to this report. The handwritten notation on the document in exhibit 2B, "same as thesis fig p. 68 except retention time changed[,]" was added by the subject's Ph.D. advisor after the document was removed from the box.

to the peaks in the three thesis figures; moreover, the very small "noise" features on the baselines on the graphs in the cut-and-taped chromatograms are identical to those in the three thesis figures. Even though all of the numbers in the chromatograms in the thesis figures are not the same as those in the cut-and-taped chromatograms, OIG concludes that both chromatograms contain the same fabricated graph.

The subject does not contest the charge that the [redacted] determinations in chapter two of her thesis were fabricated.[24]

Fabricated [redacted] Spectra in Thesis Chapter Two

[redacted] spectroscopy is a method used in chemistry to provide unique information about molecules. The different peaks in an [redacted] spectrum correspond to resonances in the molecular structure of the sample analyzed. Analyses of [redacted] spectra depend on recognizing patterns in the peaks of the spectra.

Exhibit 5A is figure 2.5 from chapter two of the subject's thesis, which is an [redacted] spectrum purportedly demonstrating that she had obtained a successful result from a [redacted] experiment. Exhibit 5B is an [redacted] spectrum from the box the subject left behind that is the product of cutting and taping.[25] Spectral features in exhibit 5B were created by taping into place small pieces of paper with peaks and eliminated by taping small pieces of paper with noisy baselines over existing peaks. The spectral features have been carefully matched at the edges of the small pieces of paper so that the resulting spectrum appears to be a single continuous line. Although exhibit 5B is not itself from the thesis (it appears to be an overhead slide that would be used in an oral presentation), the fabricated spectrum in this document, including peaks and noisy baselines, is identical to the spectrum in thesis figure 2.5.[26]

The subject's Ph.D. advisor alleged that [redacted] spectra in chapter two of the subject's thesis were the result of "doctoring" and that [redacted] resonances were added to [redacted] spectra.[27] The subject contested the charge that the [redacted] resonances in chapter two of her thesis were additions to [redacted] spectra. She said: "[t]he original spectrum is that of the substrate during synthesis. The corresponding [redacted] spectra are that of two separate substrate pools and thus lead to the differences in chemical shift of the [redacted] products."[28] While the subject's explanation may accurately describe the origin of pieces of [redacted] spectra that she used in creating exhibits 5A and 5B, OIG does not believe that the subject's explanation does or can justify creating [redacted] spectra by cutting and taping.

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[24]Letter from the subject to OIG (1 September 1998) (exhibit 1D); letter from the subject to Associate Dean at 1 (1 October 1996) (exhibit 1C).

[25]An enhanced-contrast copy of the document and a normal-contrast copy are included in exhibit 5B.

[26]Additional evidence of fabricated [redacted] spectra from the box the subject left behind is available for review in our administrative record.

[27]Letter from the subject's Ph.D. advisor to Chair of the Committee (25 June 1996) (exhibit 1B).

[28]Letter from the subject to Associate Dean (1 October 1996) (exhibit 1C).

Having considered the evidence from the box the subject left behind and the subject's response to the allegation, OIG concludes that the [redacted] spectra in chapter two of the subject's thesis were fabricated.

Fabricated [redacted] Spectrum in Thesis Chapter Three that Was Published

Exhibit 6A contains figure 3.6(d) from chapter three of the subject's thesis, an [redacted] spectrum that purportedly demonstrates a successful result in certain [redacted] experiments. The significant [redacted] resonance in this figure is the most prominent feature in the [redacted] spectrum between –17 and –18; this resonance has a peak extending below the baseline closely associated with a peak extending above the baseline. The same spectrum was also published in two papers, as shown in exhibits 6B and 6C.[29] We will refer to this spectrum as the published spectrum.

Exhibit 6D is an [redacted] spectrum, from the box left behind by the subject, that is the product of cutting and taping.[30] Exhibit 6D was created by taping eight small pieces of paper containing different spectral features, including resonances and noisy baseline segments, to a blank sheet of paper. A labeled axis has been taped below the spectrum. The spectral features have been carefully matched at the edges of the small pieces of paper so that the resulting spectrum appears to be a single continuous line. Although the published spectrum is not identical to the cut-and-taped spectrum of exhibit 6D (for example, the same prominent feature appearing near –9.8 in the published spectrum appears near –9.3 in the cut-and-taped spectrum), the published spectrum incorporates some of the cut-and-taped features. OIG believes that any spectrum that incorporates cut-and-taped features, without explicitly acknowledging such manipulation, was fabricated. The noisy baseline between –18 and –20 in the published spectrum is identical to the cut-and-taped-spectrum, which in this region is composed of two smaller pieces. The published spectrum and the cut-and-taped spectrum are also the same between –11 and -17, a region that includes a prominent feature along with noisy baseline. The cut-and-taped spectrum in this region, too, is composed of several smaller pieces.

The subject rejected her Ph.D. advisor's charge that the [redacted] resonances in these spectra were fabricated, arguing that the allegedly fraudulent published data "was observed at the reported chemical shift during *one* experiment. This result was never reproduced by myself."[31] OIG believes that observing the desired effect in one of her experiments does not and cannot justify the subject's misrepresentation of spectra, created to reproduce her alleged observations, as data actually obtained in her experiments.

Having considered the evidence from the box the subject left behind and the subject's response to the allegation, OIG concludes that the published spectrum, in thesis

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[29] [redacted] (retracted by [redacted]

[30] An enhanced-contrast copy of the document and a normal-contrast copy are included in exhibit 6D.

[31] Letter from the subject to Associate Dean (1 October 1996) (emphasis in original) (exhibit 1C).

figure 3.6(d) (exhibit 6A), figure 3(d) (exhibit 6B), and figure 10(d) (exhibit 6C), was fabricated.

Fabricated [redacted] Analyses in Thesis Chapter Two

In a [redacted] analysis, chemical compounds dissolved in solution are separated by a [redacted], then passed through a [redacted] spectrometer [redacted]. The different compounds pass through the chromatograph at different rates. The peaks on the [redacted] graphs showing the output of the [redacted] over time, correspond to the different compounds. As each compound emerges from the [redacted] it is fed into a mass spectrometer. The [redacted] spectrometer separates molecules and molecular fragments of the input compound by molecular weight. Peaks are observed in the mass spectrum at the mass of each kind of molecule and molecular fragment. These peaks identify the compounds dissolved in solution.

Unlike the evidence discussed above concerning the [redacted] determinations and the [redacted] spectra, actual cut-and-taped instrument output for the [redacted] analyses is lacking. OIG believes that the evidence provided to us by the institution, however, supports the allegation—and the Committee's conclusion—that the [redacted] analyses were fabricated. Thesis figure 2.13, an example of the [redacted] analysis in chapter two of the subject's thesis, is attached as exhibit 7A. Two [redacted] results, from the box the subject left behind, are attached as exhibits 7B and 7C. Exhibits 7B and 7C were not included in the subject's thesis, but are integral to the analysis leading to thesis figure 2.13. The lower plots in exhibits 7B and 7C are the mass spectra presented in thesis figures 2.13(a) and (c), respectively; the upper plots in exhibits 7B and 7C are [redacted] that were not included in the thesis. The faint lines and shaded markings highlighted on exhibits 7B and 7C are the "effect of cutting-and-taping" described by the subject's Ph.D. advisor as evidence that the [redacted] results were fabricated.[32]

Aside from the evidence of cutting-and-taping, the subject's Ph.D. advisor told OIG that the experiments leading to thesis figure 2.13 were unlikely to produce the [redacted] data in the upper plots of exhibits 7B and 7C or the data in thesis figure 2.13. First, he pointed out that the [redacted] in exhibits 7B and 7C contain only single peaks (near 11 minutes) for each 25-minute analysis. He told OIG that if the reaction studied in thesis figure 2.13 were analyzed with a [redacted] the resulting [redacted] should have included peaks corresponding to other compounds during a 25-minute analysis, in addition to the single product peaks shown in the [redacted] in exhibits 7B and 7C. Second, the subject's Ph.D. advisor said that another graduate student, who studied the same reaction after the subject left the institution, found that the reaction actually took much longer than the 10 minutes claimed by the subject in the caption to thesis figure 2.13. Finally, the subject's Ph.D. advisor explained that [redacted] spectra presented in thesis figure 2.13 do not reflect the presence of expected, naturally occurring [redacted] isotopes, which would have introduced additional peaks (shown as vertical lines) in that figure.

[32]Letter from the subject's Ph.D. advisor to Chair of the Committee at 2 (25 June 1996) (exhibit 1B).

The subject does not contest the charge that she fabricated the [redacted] results.[33]

OIG's Assessment of the Evidence

Based on our review of the documentary evidence provided by the institution, OIG agrees with the Committee that "[redacted], and [redacted] spectra reported in the thesis [have] been altered through cutting and pasting to eliminate actual data and add new spectral features where none appeared in authentic spectra."[34] The Committee concluded that "the heart of [the subject's] dissertation is based on fraudulent data" and found "a very clear pattern that undermines the entire basis for the research reported in the dissertation."[35]

The evidence overwhelmingly supports the conclusion that the subject fabricated the spectra and chromatograms discussed above. Such fabrications required deliberate and carefully planned actions, which were carried out with the objective of misleading the subject's institution into granting her a doctoral degree: this is willful conduct. OIG agrees with the Committee that the subject's research fabrications, which undermined the basis for the research reported in her thesis and led the subject to accede to the rescission of her Ph.D. degree, are a serious deviation from accepted practices and, therefore, misconduct in science under NSF's regulation.[36]

In deciding what actions are appropriate when misconduct is found, it is appropriate for NSF to consider whether the subject's acts are part of a pattern.[37] Accordingly, we note that several other cut-and-taped spectra were found in the box the subject left behind.[38] While these cut-and-taped spectra were not included in the subject's thesis, they reflect a pattern of fabrication by the subject.

OIG's RECOMMENDATION

We recommend that NSF affirm the seriousness of the subject's acts by finding that the subject committed misconduct in science and issuing a letter of reprimand. We do not believe further action by the government is necessary because the actions taken by the institution are adequate to protect the government's interests and the subject advises us that she has not worked in [redacted] since she forfeited her degree. We recommend that NSF develop a notification requirement so that, should the subject perform federally

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[33]Letter from the subject to OIG (1 September 1998) (exhibit 1D); letter from the subject to Associate Dean at I (1 October 1996) (exhibit 1C).

[34]Letter from Committee to Associate Dean (25 June 1996) (exhibit 1A).

[35]Letter from Committee to Associate Dean (25 June 1996) (exhibit 1A).

[36]OIG concludes that the subject engaged in misconduct in science based on her fabrication of the [redacted] determinations, [redacted] spectra, and [redacted] analyses as discussed above. The subject does not contest the allegations that the [redacted] data and the [redacted] data were fabricated, and the subject admitted the seriousness of the uncontested charges by withdrawing her thesis and returning her Ph.D. degree. OIG believes that, even based solely on the uncontested allegations, the subject's fabrications constitute misconduct in science.

[37]45 C.F.R. § 689.2(b)(3).

[38]*See* discussion *supra* note 8.

supported scientific or engineering research or education within the next three years, appropriate safeguards can be put into place.