

THE ACS COMMITTEE ON
PROFESSIONAL TRAINING
WORKSHOP ON HBCUS AND
AFRICAN AMERICAN-SERVING
INSTITUTIONS



FINAL REPORT

**The ACS Committee on Professional Training Workshop on
Increasing Participation of African American
Undergraduates in Chemistry and Increasing
ACS-Approved Chemistry Programs at
Historically Black Colleges and Universities and
African American-Serving Institutions**

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The ACS Committee on Professional Training Workshop on Increasing Participation of African American Undergraduates in Chemistry and Increasing ACS-Approved Chemistry Programs at Historically Black Colleges and Universities and African American-Serving Institutions

Executive Summary

Historically Black Colleges and Universities (HBCUs) and other African American-serving institutions are a tremendous national resource for the production of African American baccalaureate degree recipients in chemistry. The American Chemical Society (ACS) specifically, and the chemistry profession more generally, must find additional mechanisms for aiding the mission of these institutions in the production of such graduates. Toward this end, the ACS Committee on Professional Training (CPT) held a workshop with representatives of these institutions to explore more fully strategies for achieving this goal. The primary focus of this workshop was how to better utilize the ACS approval process for undergraduate chemistry programs to both increase the number of HBCUs and other African American-serving institutions holding ACS approval and to aid in the recruitment and retention of African American undergraduate students in chemistry.

Discussions at the workshop made clear that many problems that exist in undergraduate chemistry education at HBCUs and other African American-serving institutions lie within the realm of these institutions and the African American community and are outside the control of the ACS. Thus, greater mobilization of the HBCU community and greater involvement of the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers (NOBCCChE) in facilitating development of undergraduate chemistry at these institutions was deemed critical. Nonetheless, representatives from these institutions generally voiced satisfaction with the goals of the ACS approval program and the standards for excellence of undergraduate chemistry programs defined by CPT. Nonetheless, a need for increased flexibility in the guidelines for approved programs that recognizes and accommodates the different educational environment in this cohort of institutions was articulated.

In addition to these overarching conclusions, the workshop generated an expansive list of valuable and insightful recommendations for specific actions that could be taken, either by CPT or by other governance groups within the ACS, to improve the state of undergraduate education of African Americans in chemistry. These recommendations are described in detail in the text of the report and are captured here in an abbreviated form. Although all recommendations were not unanimously endorsed by workshop participants, or even a majority of workshop participants, all are included here for completeness of the record. The recommendations that follow are separated into two groups, one group of recommendations directed toward CPT and one directed toward other ACS governance groups.

Specific recommendations for CPT are broken down into categories as follows.

Recommendations Related to the ACS Guidelines for Approved Programs

- Develop greater flexibility in the guidelines for approved programs to allow sharing of resources such as major instrumentation and chemical information (e.g., *Chemical Abstracts* and journal subscriptions) between institutions;
- Focus the guidelines for approved programs on student outcomes;
- Develop a list of skills that students should possess upon graduating from approved programs;
- Develop clear statements of pedagogical goals for requiring specific instrumentation, specific content coverage, minimum number of faculty, etc.;
- Add a question to the ACS approval application form and to the ACS-approved program five-year report form about student access to academic support services and supplemental instruction;
- Mediate partnerships and/or consortia for subscriptions to electronic journals and *Chemical Abstracts* and aid in the negotiation of lower subscription rates for HBCUs and other African American-serving institutions;
- Promote service learning as an excellent pedagogical tool and as a strategy for creating a positive perception of chemistry within the African American community.

Recommendations Related to the Application Process for ACS Approval

- Provide more informal guidance/mentoring for the ACS approval process; for example, make available on the web a list of frequently asked questions about the ACS approval process with answers; develop samples of completed applications for ACS approval; include samples of completed applications from programs that would and would not be approved for institutions of different size and mission;
- Develop a web-based, informal, abbreviated application for ACS approval that would receive *formal* CPT feedback as the initial stage of the application process;
- Facilitate communication between approved and non-approved HBCU and African American-serving institutions during the application process;
- Work with other governance groups within ACS (e.g., Committee on Minority Affairs) to encourage HBCUs and other African American-serving institutions to apply for ACS approval;
- Communicate more clearly with applicant institutions on the expected timeline for the ACS approval process;
- Schedule site visits to institutions applying for ACS approval earlier in the application process to better communicate with the department and the institution.

Recommendations Related to Better CPT Communication with All Programs at HBCUs and African American-Serving Institutions, Approved and Not Approved

- Capture the perspective of those HBCUs and other African American-serving institutions not represented at the workshop on the ACS approval program, possibly by holding a workshop on ACS approval at a NOBCChE meeting;
- Provide the CPT Newsletter to *all* faculty at *all* four-year institutions awarding baccalaureate degrees in chemistry, approved or not;

- Develop a document specifically targeting HBCUs and other African American-serving institutions describing the advantages of ACS approval;
- Directly encourage chairs of programs not approved to initiate activities that would lead to ACS approval of their programs, including undertaking the self-study that is part of the formal application process;
- Increase personal contact between CPT members and departments from HBCUs and other African American-serving institutions;
- Provide more tangible recognition of ACS approval and certified graduates such as providing wall plaques for the president's office, periodic (e.g., decadal) visits of recognition for initially achieving or continually maintaining ACS approval, and graduation tassels for graduates;
- Be more proactive in providing HBCUs and other African American-serving institutions with information about the ACS College Chemistry Consultants Service (C₃S).

Recommendations Related to a Joint Comprehensive Study of Chemistry and Physics Programs at HBCUs and African American-Serving Institutions

- Work with NOBCCChE and the National Task Force on Undergraduate Physics in a study of undergraduate chemistry and physics programs at HBCUs and African American-serving institutions similar to *Strategic Programs in Undergraduate Physics* (SPIN-UP) that would have:
 - CPT take a leadership role in studies that would help define “what works” and “best practices” in producing minority graduates in chemistry;
 - CPT members make site visits to “thriving” HBCU departments;
 - CPT collect better statistical data on numbers of African American degree recipients in chemistry from all institutions, both approved and not approved,
 - CPT identify the salient attributes of HBCU and other African American-serving institution chemistry departments and their needs.

Specific recommendations for other governance groups within ACS are listed below.

Recommendations for the ACS Board of Directors

- Partner with NOBCCChE and other organizations/agencies to educate presidents of HBCUs and other African American-serving institutions about the need for greater attention to and resources for undergraduate education in chemistry (and all science, technology, engineering, and mathematics disciplines more broadly);
- Take *real* steps to lower electronic journal and *Chemical Abstracts* subscription rates for schools holding and/or applying for ACS approval.

Recommendation for the ACS Committee on Project SEED

- Make some Project SEED funds available for *solely* merit-based scholarships, removing the qualifier to demonstrate need as an evaluative criterion, to attract the best and brightest students to chemistry.

Recommendations for the ACS Petroleum Research Fund Board

- Have the Petroleum Research Fund (PRF) consider using “impact on diversity” as a criterion in funding decisions on PRF awards;

- Establish PRF Department Development grants for HBCUs and other African American-serving institutions that wish to seek ACS approval.

Recommendations for the ACS Society Committee on Education

- Develop educational materials specifically targeting minority communities (broadly defined to include K-12 students and parents, K-12 teachers, K-12 administrators, K-12 guidance counselors, community leaders, and business leaders) that demonstrate the positive impact of chemistry on their lives and the desirability of a career in chemistry;
- Invigorate chapters of the Student Affiliates of the American Chemical Society at HBCUs and other African American-serving institutions to aid in student recruitment and retention;
- Develop a document with examples of service learning activities specifically targeting the African American community;
- Arrange a symposium at a national ACS meeting on service learning as a vehicle for improving the perception of chemistry in minority communities;
- Develop a program for retired chemistry faculty members to mentor departments who desire ACS approval but who need to build their curriculum and/or infrastructure to meet the guidelines for approved programs.

Recommendations for the ACS Committee on Corporation Associates

- Find corporate sponsors for HBCUs and other African American-serving institutions for electronic journal and *Chemical Abstracts* subscription subsidies or for cost-sharing arrangements;
- Help identify industrial donors for used or barely-used instrumentation and equipment;

Recommendations for the ACS Committee on Minority Affairs

- Establish an HBCU Task Force within the ACS Committee on Minority Affairs that would take a visible and proactive role in partnership with CPT in monitoring and encouraging ACS approval of chemistry programs at HBCUs and other African American-serving institutions;
- Work to heighten the visibility of minority role models within the African American community;
- Make some ACS Scholars funds available for *solely* merit-based scholarships, removing the qualifier to demonstrate need as an evaluative criterion, to attract the best and brightest students to chemistry;
- Aid institutions in organizing consortia for shared access to electronic journals and *Chemical Abstracts*.

Recommendation for the ACS Committee on Meetings and Expositions

- Explore mechanisms for facilitating the participation of undergraduates in regional ACS meetings, such as changing meeting times to spring in some years, to present results of their research.

Recommendation for the ACS Graduate Education Advisory Board

- Hold an Academic Employment Initiative Fair at a NOBCChE meeting.

The ACS Committee on Professional Training Workshop on Increasing Participation of African American Undergraduates in Chemistry and Increasing ACS-Approved Chemistry Programs at Historically Black Colleges and Universities and African American-Serving Institutions

The lack of diversity of our nation's science, technology, engineering, and mathematics (STEM) workforce has been the focus of considerable attention in recent years.¹⁻⁵ Such attention stems from the realization that the scientific and technical problems facing this nation require diverse solutions that can only come from an equally diverse scientific and technical workforce. The nation's population demographics⁶ are becoming less and less a white Caucasian majority with persons of African American, Hispanic, Asian American, and Native American descent increasing substantially in number. Despite these changes, individuals of African American, Hispanic, and Native American descent remain significantly underrepresented in the nation's STEM workforce with potentially devastating long-term consequences for the country's economic health, standard of living, homeland security, and national defense.

One pressure point in the "pipeline" of potential participants from these underrepresented groups in the STEM workforce occurs at the undergraduate level. Despite their presence in the year 2000 general U.S. population at the rate of 12.9%, 12.5%, and 0.9%,⁶ African Americans, Hispanics, and Native Americans received only 8.1%, 7.0%, and 0.7%, respectively, of the baccalaureate degrees in STEM disciplines in 2001.⁷ Although these statistics have many complex underlying causes, unequal access to and unsuccessful navigation of postsecondary pathways to baccalaureate degrees in STEM are significant contributors to the underrepresentation of these groups.

In the discipline of chemistry, these groups are underrepresented to an extent comparable to other STEM disciplines. According to the National Science Foundation's *Characteristics of Recent Science and Engineering Graduates: 2001*, of the 17,800 chemistry baccalaureate degree recipients in the years 1999 and 2000 (excluding biochemistry), 9.0% were African American, 6.2% were Hispanic, and <1% were Native American.⁸ These statistics are consistent with those CPT has recently begun to collect in annual reporting of approved undergraduate chemistry programs. Of the 10,145 baccalaureate degree recipients in chemistry reported from approved programs for the 2003-2004 academic year, 6.5% were African American, 5.3% were Hispanic, and <1% were Native American.

CPT statistics for African American chemistry degree recipients can be disaggregated further by institution type. Of the 653 African American degree recipients, 34% came from bachelor's institutions, 23% came from master's institutions, and 43% came from doctoral institutions.⁹ Comparison of these values to the percentage of total baccalaureate degrees in chemistry produced by these institutions of 32%, 17%, and 51% for bachelor's, master's, and doctoral institutions, respectively, indicates that master's institu-

tions overproduced and doctoral institutions underproduced African American degree recipients relative to their contributions of total degree recipients.

The contributions of HBCUs to the production of baccalaureate degrees in chemistry from ACS-approved programs are substantial. The Higher Education Act of 1965 defines an HBCU as: "...any historically black college or university that was established prior to 1964, whose principal mission was, and is, the education of black Americans, and that is accredited by a nationally recognized accrediting agency or ... [is] making reasonable progress toward accreditation."¹⁰ The White House Initiative on HBCUs¹¹ recognizes 105 HBCUs, most of which are located in the Southeastern states and the District of Columbia. They include 40 public four-year, 11 public two-year, 49 private four-year, and 5 private two-year institutions.¹¹ In 2001, HBCUs enrolled 12.9% of all African American students in higher education, although they constitute only 3% of America's 4,084 institutions of higher education.¹² These institutions awarded 44.8% of degrees in the physical sciences to African American students in 2001.¹³

Of the 89 four-year HBCUs, Peterson's Guide¹⁴ indicates that 70 institutions offer baccalaureate degrees in chemistry. Only 20 of the 70 HBCUs that award chemistry degrees have ACS-approved chemistry programs. This cohort represents only 3% of the 630 ACS-approved institutions, yet in 2003-2004, these institutions graduated 167 African American chemistry degree recipients, or 26% of those from ACS-approved programs. Other institutions also serve a significant population of African American students. These are similarly designated by the Department of Education as accredited postsecondary minority institutions¹⁵ and are referred to in this report as "African American-serving institutions." Other ACS-approved African American-serving institutions¹⁶ awarded an additional 30 degrees to African Americans. Thus collectively, HBCUs and other African American-serving institutions generated 30% of the African American baccalaureate degrees in chemistry last year. The remaining 50 HBCUs and an unknown number of other African American-serving institutions that award chemistry degrees but do not have ACS-approved programs undoubtedly account for additional African American graduates not represented in this count. These statistics underscore the critical role played by HBCUs and other African American-serving institutions in producing African American baccalaureate degrees in chemistry.

History and Objectives of the Workshop

The American Chemical Society, along with the profession of chemistry more broadly, has become increasingly concerned with its relative lack of diversity. In 2002, the Task Force on Minorities in Academe was appointed by the ACS Board of Directors to consider ways to increase the number of minority faculty in chemistry at institutions of higher education, especially the top 50 research universities. This Task Force adopted the following vision statement to guide its work:

“The American Chemical Society recognizes the need to develop fully the academic potential of all the nation’s citizens. The ACS will, therefore, develop and implement programs that will increase the participation of underrepresented minorities in the chemical academic community to a level that reflects their representation in the country’s population.”¹⁷

The ACS Task Force, chaired by the late Dr. Stanley C. Israel (Texas State University) and co-chaired by Dr. Joseph S. Francisco (Purdue University), considered its charge in the broader context of crucial decision-making junctures along the educational and professional pathway that leads to a successful academic career and defined the following objectives for its work:

- Increase the number of underrepresented minority undergraduate students choosing to pursue graduate work in chemistry;
- Increase the number of underrepresented minority graduate students choosing an academic career; and
- Increase the number of underrepresented chemistry faculty that become tenured.¹⁸

The Task Force made 14 recommendations to the ACS Board of Directors that were eventually endorsed and accepted with an implementation timeline of three years. These recommendations fell into six categories as delineated below:¹⁸

- Develop partnerships to facilitate these goals within, across, and beyond the profession;
- Add value by reshaping boards and other bodies of leadership within the profession to be more inclusive;
- Achieve educational outreach through a series of activities;
- Collect and disseminate better data on the participation of underrepresented minorities in chemistry;
- Enable mentoring; and
- Establish financial incentives to facilitate the participation of underrepresented minorities in higher education in chemistry.

The appointment and work of this ACS Board Task Force on Minorities in Academe paralleled exactly in time discussions within a subcommittee of CPT on the underrepresentation of minority-serving institutions, particularly HBCUs, among ACS-approved institutions. These discussions had been initiated and led by Dr. Billy Joe Evans (University of Michigan) during his tenure on CPT and were continued following the completion of his service to the Committee. Two members of CPT, Dr. Jeanne E. Pemberton (University of Arizona) and Dr. Carlos Gutierrez (California State University-Los Angeles) had been appointed as members of the Task Force on Minorities in Academe and served as conduits for expression of CPT’s concerns about lagging minority student participation in chemistry at the undergraduate and graduate levels and the underrepresentation of minority-serving institutions (MSIs) on the list of ACS-approved undergraduate programs in chemistry.

One recommendation from the Task Force on Minorities in Academe was for CPT to host a workshop with representatives from MSIs to understand the incentives and barriers

to ACS approval at these institutions and to formulate a strategy for increasing the number of MSIs that hold ACS approval of their undergraduate programs. The ACS Board of Directors endorsed this recommendation, mandated that CPT hold such a workshop, and provided partial funding for this purpose. The charge to host a workshop was perfectly consistent with past CPT practice for communicating with various segments of the undergraduate chemistry community and with the strategy that CPT had devised for moving forward on the problem of increasing the number of MSIs with ACS-approved chemistry programs.

After further discussion, CPT decided that a single workshop would be insufficient to address the diverse challenges faced by MSIs serving different student populations. Therefore, a plan for at least two workshops was conceived to separately consider specific issues attendant to distinct segments of the MSI population. The workshop that serves as the basis for this report was specifically focused on institutions with a large population of African American undergraduate students, including HBCUs and other African American-serving institutions.

The specific goals for this workshop were:

- To discuss challenges associated with recruitment and retention of African American undergraduate students in chemistry and what ACS in general, and CPT specifically, might do to improve the profession's success in this arena;
- To educate CPT about the current state of chemistry departments at institutions with large African American undergraduate populations, the strengths of these programs, and the challenges of these programs with respect to maintaining program excellence;
- To devise a strategy for identifying and disseminating practices that work in developing strong chemistry programs that educate significant numbers of African American students; and
- To develop other specific recommendations for CPT (and ACS) for actions that would facilitate the participation of African American undergraduates in chemistry.

Through this workshop, CPT specifically sought to *initiate a dialogue* with HBCUs and African American-serving institutions on steps to engender greater participation of African American undergraduates in chemistry and to increase participation of such institutions in the ACS approval process.

Participants at this workshop were recruited from a cross-section of chemistry departments from HBCUs and other African American-serving institutions, with representation from both ACS-approved departments and those departments not holding ACS approval of their programs. Within the latter group, several institutions that are in various stages of applying for ACS approval were included. Institutions were also chosen to be geographically representative. Workshop participants came from the following institutions: Alcorn State University (MS), Chicago State University (IL), Claflin University (SC), Clark-Atlanta University (GA), Fisk University (TN), Florida A&M University (FL), Hampton University (VA), Jackson State University (MS), Morehouse College (GA), Morgan State University (MD), Norfolk State University (VA), North Carolina Central University (NC), Prairie View A&M University (TX), Savannah State University

(GA), Southern University and A&M College (LA), Spelman College (GA), Texas Southern University (TX), and Tuskegee University (AL).

In addition to representatives from HBCUs and other African American-serving institutions, workshop participants included six members of CPT, five ACS staff members, Ms. Madeleine Jacobs (Executive Director, ACS), Dr. Charles P. Casey (President, ACS), Dr. Sandra McGuire (Chair, ACS Committee on Minority Affairs), Mr. Rudy Baum (Editor, *Chemical & Engineering News*), Dr. Christopher Hollinsed (DuPont), Dr. Marquita Qualls (President, NOBCChE), Dr. Arthur Ellis and Dr. Henry Blount (National Science Foundation), Dr. Robert Hilborn (Chair, National Task Force on Undergraduate Physics), and several distinguished guests including Dr. Frederick Humphries and Dr. Billy Joe Evans. A complete list of workshop participants is contained in Appendix A.

The workshop consisted of three sessions, each with several short introductory presentations to motivate discussions that occurred in subsequent breakout groups. The workshop agenda can be found in Appendix B. Breakout groups were led by CPT members, who served as reporters for each group, and a scribe was assigned to each group for note-taking. Breakout group compositions are listed in Appendix C.

Session 1: Challenges & Strategies in Recruiting & Retaining African American Undergraduates in Chemistry

*Speakers: Dr. Joseph Francisco, CPT and Purdue University
Dr. Frederick Humphries, Florida A&M University
Dr. Sandra McGuire, Louisiana State University
Dr. Hossein Nanaie, Claflin University*

This session provided the framework for concern within the chemistry profession about the underrepresentation of African Americans. Challenges associated with recruiting and retaining African American undergraduates were discussed. Participants also considered effective strategies for recruiting and retaining African American students in chemistry.

Session 2: Incentives & Barriers to ACS Approval of Undergraduate Chemistry Programs

*Speakers: Dr. Carlos Gutierrez, CPT & California State University–Los Angeles
Dr. Ralph Turner, Florida A&M University
Dr. Cornelia Gillyard, Spelman College
Dr. David Kanis, Chicago State University
Dr. George Williams, Savannah State University*

This session considered institutional incentives for attaining ACS approval of an undergraduate chemistry program from the standpoint of HBCUs and other African American-serving institutions and the most significant barriers that deter or prevent such institutions from seeking or attaining ACS approval.

Session 3: Strategies for Increasing Participation of African American Undergraduates in Chemistry and Increasing ACS-Approved Chemistry Programs at HBCUs and African American-Serving Institutions

Speaker: Dr. Robert Hilborn, Amherst College & National Task Force on Undergraduate Physics

This session considered a possible model for defining and promulgating effective practices at the departmental level for increasing participation of African American undergraduate students in chemistry and increasing the number of HBCU and other African American-serving institution departments that seek and attain ACS approval.

Session 1: Challenges & Strategies in Recruiting & Retaining African American Undergraduates in Chemistry

Brief Overview of Presentations

Dr. Joseph Francisco provided a brief history of the ACS Task Force on Minorities in Academe that was established to address the serious underrepresentation of minority faculty members in chemistry, especially at the top 50 research institutions. He described the focus of the Task Force on critical transitions in a faculty member's career development that led to the focus on ACS approval of undergraduate programs at MSIs. The Task Force articulated the desirability of having more MSIs attain ACS approval of their undergraduate programs given the role of such institutions as critical conduits in the pipeline. Specifically in the case of African Americans, he noted that of the very few native-born African American faculty members on chemistry faculties at research universities, most received their undergraduate education at an HBCU. He also pointed out that the vast majority of African American graduate students in chemistry received their baccalaureate degrees from HBCUs. Finally, he noted that chemistry departments at HBCUs and other African American-serving institutions face many challenges that do not exist at majority institutions, and hence, the need for this workshop for dialogue on these issues and to identify potential steps to their resolution.

Dr. Frederick Humphries presented his perspective on the most significant barriers related to recruiting and retaining African American students in chemistry. These include the perceived lack of career rewards for the effort, the need for more structured pathways that proactively guide students to pursue a career in chemistry, the insufficiency of resources such as scholarships to attract the best and brightest African American students to chemistry, and the lack of a "culture of science" within the African American community that supports student career choices in science disciplines such as chemistry. Dr. Humphries also provided brief overviews of several noteworthy and suc-

successful programs specifically designed to recruit and retain African American students in chemistry that he developed during his tenure as a faculty member and administrator at Florida A&M University.

Dr. Saundra McGuire presented an overview of strategies used at Louisiana State University (LSU) to recruit and retain African American students. Specifically, she described several strategies used by the LSU Center for Academic Success that have their basis in advances in cognitive science. These strategies have led to a documented improvement in retention of African American students in STEM disciplines. She also cited the value of building community between students and engaging students in research and service learning early in their undergraduate careers to assist in student retention.

Dr. Hossein Nanaie described several innovative strategies used by the chemistry department at Claflin University to recruit and retain African American students in chemistry. Several notable examples include allowing award-winning students in chemistry to accompany department faculty on visits to area high schools, having the department chair send a letter and a brochure about the department to all guidance counselors in regional feeder high schools, and sending a letter co-signed by the department chair and the Local ACS Section President to all incoming freshmen at Claflin with a department brochure inviting them to come to the department to learn more about becoming a chemistry major. Dr. Nanaie reported that through these routes, the chemistry department at Claflin has developed a vigorous and successful undergraduate program that continues to attract significant numbers of African American undergraduate majors.

Breakout Group Discussions

Breakout group discussions in this session were motivated by the following questions:

- What are barriers and challenges to recruiting African American undergraduate students to chemistry?
- What are successful strategies for recruiting African American undergraduate students to chemistry?
- What are barriers and challenges to retaining African American undergraduate students in chemistry?
- What are successful strategies for retaining African American undergraduate students in chemistry?

Participants identified several significant barriers to the recruitment of African American undergraduate students into chemistry. It should be noted that many of these barriers are not unique to HBCUs and African American-serving institutions but also exist in chemistry departments at many four-year majority institutions. Despite the commonality of these challenges, they often represent more significant barriers to recruitment at HBCUs and other African American-serving institutions as a result of the greater diversity of student, faculty, and institutional backgrounds represented therein. Such diversity has the effect of amplifying the significance of these challenges.

Participants made note of the fact that the burden of educating African American undergraduate students in chemistry should not fall solely on HBCUs and other African American-serving institutions. This responsibility must be broadened beyond these institutions to predominantly majority institutions as well.

One significant barrier identified to recruiting African American undergraduates into chemistry was lack of adequate scholarship money. Participants expressed the viewpoint that too often, scholarships are based solely on need and not intellectual merit, thereby preventing departments from providing sufficient incentives to the best and brightest African American students to pursue careers in chemistry. Participants noted that ACS is equally guilty of this practice in awarding Project SEED and ACS Scholars funds, totally or in part, on the basis of need. The recommendation that ACS make at least a portion of these awards based solely on merit was strongly endorsed by those at the workshop.

Participants also expressed frustration at being somewhat removed from the student recruitment, admissions, and scholarship awarding processes at their institutions. This stratification of institutional responsibilities often prohibits departments from identifying and recruiting students who could be potential chemistry majors but who might have standardized test scores that fall just below the institution's admission cut-off or who have remediable academic deficiencies that prevent their admission into the institution.

Students need appropriate guidance and mentoring in order to successfully navigate critical academic transitions such as the transition from high school to college or from a two-year institution to a four-year institution. Attrition among students with an interest in science is very high at these transitions points, although it was noted that students who transfer from two-year institutions often have lower attrition rates in science disciplines such as chemistry than students who matriculate initially at four-year institutions. Participants noted inadequate or highly variable high school preparation, especially in mathematics, that makes it very difficult to build the appropriate undergraduate science core in a four-year curriculum. Special programs to build mathematics skills early in the undergraduate years or even before college matriculation are needed to remediate such deficiencies that prevent students from pursuing careers in mathematics-intensive physical sciences such as chemistry.

Another significant challenge to recruiting African American students into chemistry is the fact that chemistry must compete with other disciplines and career paths that might appear to be more exciting, more financially rewarding, or more culturally acceptable for the effort required to acquire a baccalaureate degree in chemistry. For example, many African American students with a predisposition toward science major in disciplines that allow them to pursue careers in medicine.

In his presentation, Dr. Humphries argued strongly for the need to create clear, structured, and identifiable pathways to a career in chemistry for students early in their careers so that they might see the "light at the end of the tunnel." Undergraduate students specifically, and the African American community more generally, often lack an understanding of chemistry either as a discipline or as a profession. Several participants

recommended that CPT promote service learning as a way to enhance the visibility of chemistry within the community and to improve the attractiveness of chemistry to potential undergraduate students. One additional factor that has contributed to the poor image of chemistry within the African American community is the lack of chemistry role models and their lack of visibility in the community relative to professionals like medical doctors or lawyers. More educational efforts about the benefits of chemistry and about careers in chemistry, specifically targeting the African American community, are needed. ACS could help mitigate this problem by developing educational materials that address the positive impacts of chemistry on minority communities and the desirability of a career in chemistry. Such materials should broadly target segments of the community associated with the K-12 system (including students, parents, teachers, administrators, and guidance counselors) as well as community leaders such as ministers, politicians, and business leaders. ACS should also do more to heighten the visibility of African American chemists as role models within these communities.

Finally, the quality of undergraduate teaching, especially in introductory courses, is often uninspiring and not responsive to the changing mindset of today's students. Students are often more interested in understanding the connection of a discipline to the reality of their lives than in past generations. They are also more likely to seek "instant gratification" in all aspects of their lives including their studies, and the hierarchical nature of science in which a broader understanding of significance is often not experienced until the advanced level of study causes students to lose interest in core disciplines such as chemistry. Faculty are also often not knowledgeable about advances in cognitive science and learning theory that would allow them to better teach chemistry to a diverse cohort of students. This problem is exacerbated by the fact that a significant fraction of faculty at HBCUs and other African American-serving institutions are not native-born citizens, and therefore, often do not appreciate the nuances of American culture and its influence on this generation of students.

Challenges associated with retaining African American students in chemistry were also considered at the workshop, and several of these are closely related to challenges identified with recruiting African American undergraduates. To retain African American students, more must be done including providing adequate financial assistance beyond tuition, ensuring good mentoring and advising of students, and providing them with the necessary skills in mathematics, studying, and time-management needed to be successful in a demanding undergraduate curriculum such as chemistry. Participants recommended that CPT add a question to the initial self-study for ACS approval and the five-year report form from approved programs that specifically asks about student learning support services as a way to gauge the ability of a particular institution to support an ACS-approved program in chemistry.

In addition, participants noted the necessity of providing students professional experiences, such as research opportunities or industrial internships, early in their undergraduate careers to engage them in the discipline and enable them to inculcate the excitement and relevance of chemistry. Such experiences also allow students to develop a view of themselves as successful and equal participants in the profession. Involving students in local chapters of Student Affiliates of the American Chemical Society (SAACS) and

NOBCChE can also lend a more professional perspective to the undergraduate experience as well as provide a sense of community among students. Related to this is the need for increased attention to faculty development opportunities such as sabbaticals, participation in workshops and summer research experiences, and funded travel opportunities at this cohort of institutions in order that faculty maintain and convey the excitement of modern chemistry to students in their classrooms. Realizing these improvements at HBCUs and other African American-serving institutions will undoubtedly require partnering with other segments of the profession such as industry, government laboratories, research universities, and government funding agencies.

Finally, participants articulated the need for departments at HBCUs and other African American-serving institutions to proactively develop programs whose goal is to prepare degree recipients for graduate work in chemistry, and not to operate in a strictly reactive mode to student interest in graduate study. A related need is for departments at HBCUs and other African American-serving institutions to engender greater engagement by institutional administrators, especially presidents, on the importance of increased attention to and funding for undergraduate education in chemistry (and STEM more broadly.)

Session 2: Incentives & Barriers to ACS Approval of Undergraduate Chemistry Programs

Brief Overview of Presentations

Dr. Carlos Gutierrez discussed incentives and barriers to ACS approval of undergraduate chemistry programs from the CPT perspective. He indicated that ACS approval signifies a high-quality chemistry program that confers on degree recipients from that program a level of professional prestige that can result in a slightly higher salary. He also noted that one beneficial consequence of ACS approval is the expectation of sustained institutional administrative support of a program and that often, CPT can leverage this expectation into helping a given program maintain approval.

Dr. Gutierrez also shared with workshop participants the most common problems routinely encountered by departments in attaining or retaining ACS approval of their chemistry programs, particularly at non-doctoral institutions. Among these, he noted the difficulty of maintaining faculty teaching contact hours at or below 15 hours per week, meeting library requirements such as a minimum number of journal subscriptions and adequate access to *Chemical Abstracts*, teaching of both core and advanced courses at an acceptable frequency, and maintaining an operating NMR spectrometer. He noted that upon initial application for ACS approval, a process is set in motion that usually requires several years for completion. During this time, a department must establish all aspects of their program at an acceptable level of quality and demonstrate sustainability of the program at this level.

Dr. Ralph Turner presented the results of an informal survey of 15 four-year HBCU chemistry departments that do not currently hold ACS approval of their undergraduate programs. His survey was constructed so as to identify the major obstacles to ACS approval for these programs. Collectively, these programs reported having approximately 260 chemistry majors. The most significant barriers to establishing a program consistent with the ACS guidelines for approved programs were related to infrastructure deficiencies and problems with faculty expertise and workload. Specifically, many institutions did not have a functioning NMR spectrometer, adequate library facilities including subscriptions to the requisite number of journals or access to *Chemical Abstracts*, or adequate facilities for waste disposal. In addition, many departments had no faculty in inorganic chemistry and a significant fraction of faculty members with teaching contact loads in excess of 15 hours per week. Although not acquired in a formal survey, these statistics provide useful insight into the systemic problems faced by departments at many non-approved HBCUs and other African American-serving institutions.

Dr. Cornelia Gillyard presented the incentives and barriers to ACS approval from the Spelman College perspective, and noted that the incentives and barriers for a department at one HBCU may not be the same as another HBCU, since this cohort of institutions is very diverse in mission and environment. She cited several significant institutional incentives for ACS approval, and noted that primary among these incentives is an enhanced institutional reputation that can be used to garner resources and attract and retain high quality students and faculty.

From the departmental perspective, she noted that ACS approval enhances a department's reputation within the institution that can be leveraged for resources to support the department's mission. She reported that ACS approval is particularly important in "recruiting" the parents of students. In addition, she pointed out that the self-study that must be completed upon initial application for ACS approval supports departmental strategic planning and strengthens a department's position and preparation for routine external review. Barriers cited by Dr. Gillyard include lack of sufficient resources, lack of administrative support, lack of faculty leadership, lack of faculty support for ACS approval, and inadequate infrastructure. Curriculum challenges, low numbers of majors, and faculty size were additional barriers mentioned by Dr. Gillyard.

Dr. David Kanis discussed incentives and barriers to ACS approval from the perspective of the approved chemistry program at Chicago State University. As context for his comments, Dr. Kanis provided a brief synopsis of the student population at Chicago State University that, despite not being an HBCU, is 90% African American. He noted that although they have about 10 chemistry majors per year, only one student in 15 years pursued the ACS-approved program to receive a certified degree. Dr. Kanis also noted that nearly all of the chemistry students attending Chicago State are geographically constrained to the Chicago area, and therefore, cannot attend a traditional HBCU. He reminded participants that while HBCUs receive much of the attention when participation of African Americans in STEM is considered, many students cannot attend these institutions for family or other reasons, since they are largely concentrated in the southeast. Therefore, any efforts to increase the number of African Americans in chemistry

must consider institutions other than HBCUs that serve this large population in urban areas of the northeast, Midwest, and southwest.

The largest barriers to maintaining ACS approval for Chicago State include the requirements for chemical information resources and the teaching of courses with low enrollment, particularly the minimum of two advanced courses required every year by the ACS guidelines. According to Dr. Kanis, the problem with the requirement to teach two advanced courses lies in the CPT definition of what constitutes an advanced course. He noted that students entering Chicago State University frequently have poor skills in basic mathematics, and thus, chemistry majors often do not have the mathematics prerequisites to take physical chemistry until their senior year. This renders the taking of advanced courses built on core physical chemistry as a prerequisite nearly impossible.

Dr. George Williams described the motivations for the chemistry department at Savannah State University to recently apply for ACS approval and the challenges they face in attaining ACS approval. The goal of ACS approval of their chemistry program is part of an overall strategic plan to establish a comparative advantage with other institutions in the state of Georgia with whom they compete for students. One significant motivator for Savannah State is that students have voiced interest in ACS approval of the chemistry program. These students perceive ACS approval as enhancing their prospects for acceptance to graduate school or acquiring employment. Dr. Williams noted that the administration is willing to support “accredited” programs and that such “accreditation”, or approval in the case of ACS, helps build institutional capacity, thereby making the institution more attractive to students.

Dr. Williams then described his views on the most significant barriers to ACS approval facing HBCUs and other African American-serving institutions. Several requirements of the ACS guidelines are continually troublesome to this cohort of institutions. The limit of 15 hours per week of contact time for faculty teaching is often difficult for many institutions to meet. One strategy often used to meet this limit is the hiring of part-time faculty, a practice that Dr. Williams argued can be detrimental to the quality of education provided. He also noted that many institutions find meeting the library requirements for 20 journal subscriptions prohibitively costly, as is maintenance of major instrumentation such as NMR spectrometers. HBCUs and other African American-serving institutions often find intimidating the self-study form used as the first step in the application process, and he suggested providing a clearer indication on the form of the information CPT is expecting in an institution’s response. As an example, he cited the request on the self-study form for information about the financial operations of a department. In the absence of specific minimum amounts indicated as acceptable, the open-ended nature of this question may be intimidating and deter many institutions from applying. Finally, he also noted that too often, HBCUs and other African American-serving institutions seeking ACS approval do not consult with other such institutions that hold ACS approval for guidance and mentoring in navigating the application process and in understanding better CPT’s expectations.

Breakout Group Discussions

Breakout group discussions in this session were motivated by the following questions:

- What are institutional incentives for ACS approval of an undergraduate chemistry program?
- What are institutional barriers to ACS approval of an undergraduate chemistry program?
- What additional incentives might/could/should ACS or the ACS-CPT provide for institutions to achieve or maintain ACS approval of their undergraduate chemistry program?
- What are departmental incentives for ACS approval of an undergraduate chemistry program?
- What are departmental barriers to ACS approval of an undergraduate chemistry program?
- What additional incentives might/could/should ACS or the ACS-CPT provide for departments to achieve or maintain ACS approval of their undergraduate chemistry program?
- What further actions could CPT undertake to lessen institutional or departmental barriers to ACS approval of undergraduate programs?

During these breakout sessions, participants re-articulated the incentives for and barriers to ACS approval of undergraduate programs. Many of the incentives and barriers mentioned in the breakout sessions were those mentioned by the speakers. Incentives were generally agreed to include the external recognition and prestige associated with ACS approval along with the validation of program quality inherent in ACS approval. This prestige and external imprimatur of program quality were thought by participants to have several positive benefits including making it easier to acquire external grant funds from federal agencies, such as the National Science Foundation, and from industry. Furthermore, ACS recognition of a program was perceived by participants to be a significant boon to student and parent recruitment. Indeed, a particularly illustrative example of this perception was offered by Dr. Gregory Pritchett, Chair of the Chemistry Department at Tuskegee University in Alabama, who reported that ACS approval of their chemistry program is noted on page 1 of the Tuskegee University catalog. Some participants also felt that continuing ACS approval encourages internal planning by departments and provides the opportunity for reflection that assists in defining a future vision for a department.

Participants agreed that several benefits accrue to students who receive degrees from an ACS-approved department. Specifically, participants felt that a chemistry education in an approved program provides a solid foundation for graduate work or employment in chemistry as well as providing a competitive advantage for students in admission to graduate programs or in securing employment. The general consensus of those at the workshop was that, although ACS approval of a program is not necessary for a department to produce quality graduates, program quality in HBCUs and other African American-serving institutions outside of the cohort that hold ACS approval varies widely.

Participants offered several suggestions for how ACS and CPT might increase the incentives for an institution to seek and maintain ACS approval of its chemistry program. These suggestions can be categorized as steps that would *increase the visibility of ACS approval*, especially at the *local* level, both within an institution and within a geographic region. Given that most HBCUs and other African American-serving institutions attract students from a relatively small geographic region, enhanced visibility of a program could greatly assist departments in student recruitment. Specific suggestions for increasing the visibility of ACS approval included wall plaques for the president's office or a hallway in the administration building or chemistry department and ceremonial visits by a CPT representative for an award presentation upon initial receipt of ACS approval or at specific approval milestones (e.g., continuous ACS approval for 10, 20, etc. years). Providing recognition for certified graduates, such as tassels to wear during graduation ceremonies, could also enhance the visibility of ACS approval.

Barriers to ACS approval were also discussed during breakout sessions. Resource limitations were among the barriers mentioned most frequently by participants. Specifically, many of these institutions lack funds for instrument acquisition and maintenance, administrative staff, professional staff such as laboratory coordinators and instrument technicians, and for the interviewing and hiring of new faculty. As elucidated in Dr. Turner's informal survey of institutions that do not hold ACS approval, maintaining faculty contact teaching loads below the maximum level of 15 hours per week is a continuing struggle for many of these institutions in light of the severe resource limitations just noted. Particularly challenging is the teaching of courses required for an ACS-approved program (e.g., courses in which core physical and inorganic content is covered and advanced courses) when these courses generate only very small enrollments. In addition, library and chemical information resources have become increasingly difficult for many institutions to afford as subscription costs continue to escalate.

Some participants perceived the ACS guidelines to be inflexible and not adequately transparent. This has the effect of discouraging programs from applying for ACS approval. For example, several participants noted the possibility of access to major instrumentation such as NMR spectroscopy through remote access "collaboratory" arrangements, yet the guidelines are totally silent on this issue other than to require that an institution have an operating NMR spectrometer. Participants stressed the need for CPT to be more flexible in accepting unconventional arrangements such as those made possible by advances in technology that are outside traditional modes of education, especially for resource-limited institutions such as HBCUs and other African American-serving institutions.

Much of the discussion in these breakout groups focused on steps that ACS or CPT could take to lower the barriers to achieving ACS approval. Participants urged ACS to take *real* steps to lower electronic journal and *Chemical Abstracts* subscription rates for schools holding and applying for ACS approval and to aid in organizing consortia for shared access to electronic journal and SciFinder Scholar subscriptions. In addition, participants suggested that ACS could help identify corporate sponsors and/or donors to assist HBCUs and other African American-serving institutions with assistance, such as subsidies for chemical information or donating used instrumentation. Several partici-

pants also suggested that ACS develop a program that would pair retired chemistry faculty members as mentors with HBCUs and other African American-serving institutions seeking to improve their program to attain ACS approval. The suggestion that ACS hold an Academic Employment Initiative Fair at a NOBCChE meeting was also endorsed by participants.

Numerous suggestions for things CPT could do to lower the barriers for HBCUs and other African American-serving institutions to attain ACS approval were discussed. In addition to making the guidelines more “skeletal” so as to be more flexible, other ideas for improving the guidelines were also offered. Specifically, CPT was urged to allow “sharing the burden” between institutions on requirements such as major instrumentation and chemical information resources, and to have the guidelines focused on student outcomes. In other words, CPT was urged to define the skill set that students should have upon graduating from an approved program. Others felt that research and multidisciplinary exposure needed to be more prominent in the guidelines and that a more detailed description of how students and faculty benefit from being associated with an approved program should be included in the guidelines. Finally, some argued for the guidelines to contain better pedagogical arguments for specific requirements such as a minimum of four faculty members, subscriptions to 20 journals, specific instrumentation, and the limit of 15 contact hours for teaching.

Participants also had several suggestions for how CPT could improve application and five-year review procedures to make ACS approval less intimidating and burdensome. The idea that CPT should develop sample applications for programs that could be approved and not approved was widely endorsed by the group. The development of a list of “frequently asked questions” with answers that could be made available on the web was also suggested. Other participants felt that a short pre-application that could be filled out online and result in a *formal* CPT response would be useful as a prelude to the full 22-page self-study. In this way, a program contemplating application for ACS approval could get an official idea of its standing relative to the accepted benchmark prior to investing effort in the full self-study. One additional suggestion was for CPT to team an HBCU or other African American-serving institution department applying for ACS approval with an HBCU or other African American-serving institution similar in size and mission that has obtained ACS approval to provide mentoring through the application process. Finally, participants were in general agreement that timely CPT communication with departments is critical. CPT should make every attempt to be absolutely clear with departments about the typical timeline for attaining ACS approval once the process is begun to not jeopardize a department’s local credibility.

Suggestions for improvements in communication between CPT and HBCUs and other African American-serving institutions were also discussed. Many felt that information about the ACS College Chemistry Consultants Service (C₃S) needed to be more effectively disseminated to the broader community of HBCUs and other African American-serving institutions and recommended that CPT play a role in doing this. Participants suggested that the CPT Newsletter be sent to *all* faculty at *all* institutions, both approved and not approved. This strategy would be one mechanism for enhancing communication with this community, and for letting those HBCUs and African American-

serving institutions without approved programs know that the ACS is interested in them and their concerns. Furthermore, this approach would keep the concept of ACS approval on the radar screen of these institutions. It was also recommended that CPT develop a document about the value of ACS approval specifically targeted toward HBCUs and other African American-serving institutions.

Given the relatively small number of participants at this workshop, several noted the importance of capturing the perspective of those HBCUs and other African American-serving institutions not represented. Suggestions for ways to do this included publishing an article in the CPT Newsletter or a *Chemical & Engineering News* comment column on the issues discussed at this workshop addressed to the broader community of HBCUs and other African American-serving institutions. Others suggested involving NOBCChE in soliciting this input or approaching the National Association for Equal Opportunity in Higher Education (NAFEO) for assistance in gathering this perspective.

Session 3: Strategies for Increasing Participation of African American Undergraduates in Chemistry and Increasing ACS-Approved Chemistry Programs at HBCUs and African American-Serving Institutions

Brief Overview of Presentation

Dr. Robert Hilborn, Chair of the National Task Force on Undergraduate Physics, described the project Strategic Programs for Innovations in Undergraduate Physics (SPIN-UP) sponsored by the ExxonMobil Foundation, the American Association of Physics Teachers, the American Institute of Physics, and the American Physical Society. This project, completed and published in 2003,¹⁹ was a study of undergraduate physics programs that was motivated by the desire to understand why certain undergraduate physics programs were able to either maintain or increase their number of majors during the 1990s when the nationwide trend of physics degrees awarded was in decline. This project was composed of two parts: a web survey of all 761 baccalaureate degree-granting physics programs undertaken in collaboration with the American Institute of Physics Statistical Research Center, and site visits to 21 “thriving” physics departments to identify the essential attributes that make them successful.

“Thriving” departments were found to:

- view undergraduate education as a key responsibility of the department;
- produce more than four to five times the average number of baccalaureate degrees for their institution type;
- actively engage students in the life of the department through extensive faculty-student interaction including research;

- have identifiable leadership in their undergraduate education mission;
- be viewed as excellent departments within their institutions; and
- continuously evaluate their undergraduate education of majors and experiment with new approaches.

Dr. Hilborn noted that what these site visits did not find in “thriving” departments were:

- extensive interdisciplinary efforts at the undergraduate level;
- radically different curricula from the accepted norm;
- watered-down curricula;
- extraordinary use of information technology; or
- lavish new facilities.

Dr. Hilborn further noted that these “thriving” departments did not do significantly better at attracting women and minorities into physics than the average department, although the reasons for this are unclear. In considering the issue of diversity further, the National Task Force on Undergraduate Physics made trial visits to two departments known to generate a significant number of minority baccalaureate degrees in physics: Xavier University of Louisiana and the University of Texas at El Paso. These visits made clear that these two departments met all of the criteria for “thriving” enumerated above. Moreover, these site visits revealed a strong sense of *community* in these departments that is critical to their success in broadening participation in physics by students from underrepresented groups. In addition, these departments were found to engage students in the culture of physics early in their undergraduate careers and to define clearly the pathway to a baccalaureate degree for these students. Participants were struck by the strong overlap between these findings in the physics community and the critical elements articulated earlier in the workshop for broadening participation by African American students in chemistry. Analysis of the statistical data collected in the web survey showed that 40-45% of baccalaureate degrees in physics to African American students were awarded by HBCUs and that a small subset of HBCUs really excelled at educating these students. Dr. Hilborn noted that, since only a relatively small number of HBCUs have baccalaureate degree programs in physics, these statistics are quite extraordinary.

Dr. Hilborn suggested that the SPIN-UP project might be an excellent model for better understanding attributes of programs that are successful in educating African American students. He indicated that there was interest in the physics community in pursuing such a study and suggested that it might be better done in a joint effort with chemistry, since many HBCUs and other African American-serving institutions have departments of physical science that encompass both chemistry and physics. Dr. Pemberton, who was moderating this session, noted that this suggestion was to be considered in the breakout group discussions.

Breakout Group Discussions

Breakout group discussions in this session were motivated by the following questions:

Part 1: Increasing the Number of ACS-Approved Programs at HBCUs and African American-Serving Institutions

- What can ACS do to increase the number of ACS-approved undergraduate programs at HBCUs and African American-serving institutions?
- What can CPT do to increase the number of ACS-approved undergraduate programs at HBCUs and African American-serving institutions?
- Would an activity focused on HBCUs and African American-serving institutions similar to the National Task Force on Undergraduate Physics that generated the SPIN-UP report in physics be useful as a mechanism to disseminate effective undergraduate educational practices in chemistry as one step toward increasing the number of ACS-approved programs at HBCUs and African American-serving institutions?

Part 2: The ACS Role in Increasing Participation of African American Undergraduates in Chemistry

- What specific actions might ACS undertake in the short term to aid in the development of a discipline-wide strategy for increasing the participation of African American undergraduates in chemistry?
- With what other groups or organizations should ACS partner in helping to shape future disciplinary action on the goal of increasing the participation of African American undergraduates in chemistry?
- What other groups or organizations should ACS contact to solicit recommendations for useful actions to increase the participation of African American undergraduates in chemistry?

This session generated extensive discussion within breakout groups. Numerous substantive recommendations were developed for specific actions that CPT and other governance groups within ACS might take to increase the number of ACS-approved chemistry programs at HBCUs and other African American-serving institutions and to improve the ACS approval process to broaden the participation of African Americans in chemistry. Only those recommendations that are not duplicative of those made in earlier workshop sessions are described here. Although not all recommendations were strongly endorsed by all or even a majority of workshop participants, they are described here in their entirety for further consideration.

Several new recommendations for ways to improve the ACS approval program were directed to CPT. In order to increase the number of HBCUs and other African American-serving institutions seeking ACS approval, participants recommended that CPT take a more proactive role in directly encouraging chairs of chemistry departments not approved to initiate activities, such as seeking funding and laying the foundations for faculty and administrative buy-in, necessary to ready the department to apply for ACS approval. Related to this recommendation, CPT was urged to encourage such departments to undertake the self-study associated with the application for ACS approval as a

way to stimulate the internal program review essential to program quality and growth. Participants also felt that it would be useful for CPT to hold a workshop on the ACS approval program and procedures for application at a NOBCCChE meeting, although it was recognized that not all HBCUs and other African American-serving institutions would have representatives attending this meeting.

Once an institution applies for ACS approval, participants recommended that CPT make an effort to be clearer with the institution about the realistic timeline for successful navigation of the ACS approval process. Related to this, CPT was encouraged to consider making site visits to applicant institutions earlier in the application process in an effort to communicate more clearly with both the department and the administration of that institution. Participants felt that this strategy would facilitate departments sustaining administrative support for ACS approval. Finally, a recommendation for increased personal contact between CPT members and HBCUs and other African American-serving institutions was made to improve communication and to sustain their interest in ACS approval.

CPT was also encouraged to take a greater leadership role in studies that would better define “what works” or “best practices” in producing minority graduates and to disseminate this information widely. As part of CPT’s role in this regard, participants suggested that CPT members make site visits to “thriving” programs in order to identify these successful practices.

Participants also felt that CPT should play a critical role in collecting better data on African American degree production in chemistry both from approved and not approved programs. Finally, one group of participants recommended that CPT undertake a study in partnership with NOBCCChE to identify the salient attributes of chemistry programs at HBCUs and other African American-serving institutions in order to better define their unique needs.

Recommendations directed toward other governance groups within ACS, in addition to those articulated in earlier workshop sessions, also resulted from these breakout group discussions. Specifically, ACS was again urged to make some funds for Project SEED and the ACS Scholars program solely merit-based, removing the qualification to demonstrate need, in order to attract more of the highest-caliber African American students into chemistry. Participants also suggested that ACS explore mechanisms for facilitating the participation of undergraduates in regional ACS meetings to present results of their research. For example, changing the timing of a regional meeting from fall to spring in some years would better accommodate students who do not initiate undergraduate research projects until their senior year or the summer prior to their senior year. Finally, efforts aimed at reinvigorating SAACS chapters at HBCUs and other African American-serving institutions were recommended to aid in student recruitment and retention.

Concerns about the negative image of chemistry within the African American community were again voiced during this discussion. In addressing this problem, participants suggested that ACS provide more funding for service learning and perhaps even produce

a document with examples of service learning activities specifically targeted to the African American community. Another useful step that ACS could take in this regard would be to host a symposium at a national meeting on service learning as a vehicle for improving the perception of chemistry within minority communities.

Finally, one breakout group called for the development of an HBCU Task Force within the ACS Committee on Minority Affairs that would take a more visible and proactive role in monitoring ACS approval of HBCUs and other African American-serving institutions, encouraging those institutions not approved to seek ACS approval, and working with such institutions to facilitate the development of their chemistry programs to a level commensurate with ACS approval. In the full workshop discussion of this suggestion, Dr. Sandra McGuire, outgoing Chair of the Committee on Minority Affairs, raised the question of whether this critical role should be tasked to the Committee on Minority Affairs given the breadth of its existing charge and activities.

Two specific recommendations related to grant award funding were made to the ACS Petroleum Research Fund (PRF). PRF was encouraged to consider: i) using “impact on diversity” as a criterion in funding decisions on PRF awards, and ii) establishing minority department development grants for chemistry departments at HBCUs and other minority-serving institutions who wish to seek ACS approval of their undergraduate programs.

The suggestion by Dr. Hilborn that CPT partner with the physics community in a study of HBCUs and other African American-serving institutions similar to SPIN-UP elicited mixed reactions from workshop participants. The pros and cons of this recommendation were discussed, and several significant arguments in favor of this approach were advanced. Many saw this connection as a logical one given the historically close relationship between the disciplines of chemistry and physics. Some HBCUs and other African American-serving institutions have combined departments of physical science that house both chemistry and physics. Others recognized the political value inherent in a joint effort. Aligning two departments within an institution can often provide a politically stronger base for both in garnering resources from the administration as well as from external sources. Taking this concept one step further, several participants suggested that a joint effort of the chemistry, physics, and mathematics communities might be even more useful in this regard.

Despite the strength of the arguments in favor of a joint effort, other participants made note of several significant disadvantages of such an approach. Many more HBCUs and other African American-serving institutions award baccalaureate degrees in chemistry than in physics;²⁰ thus, the proposed joint approach could not be implemented for all institutions. In light of this, some participants questioned the overall value that would be added by partnering with physics in such a study. Several participants noted that many of the attributes and practices of “thriving” departments elucidated in the original SPIN-UP study were already being used at HBCUs and other African American-serving institutions. For example, a uniform characteristic of “thriving” departments examined in the SPIN-UP study was that they created a nurturing environment for students. As noted earlier in the workshop, HBCUs and other African American-serving institutions have historically provided a more

nurturing environment for students than majority institutions. Thus, some participants wondered about the value of such a study.

One breakout group strongly endorsed the notion that the community of HBCUs and other African American-serving institutions needed to solve its own problems in undergraduate chemistry education. A model was offered for how this might be accomplished through a consortium of HBCUs and other African American-serving institutions that would partner with CPT. This consortium would address the complex array of issues surrounding ACS approval of such institutions by identifying numbers of degree recipients from different institutions, implementing a self-study of all chemistry programs from such institutions, and developing an institution-specific list of needs and strategies for addressing these needs. NOBCCChE was suggested as a logical venue for regular meetings of this consortial group.

Time limitations prevented the group from coming to a clear consensus on the several suggested models for moving forward. Sufficient enthusiasm was evident for a joint chemistry/physics study similar to SPIN-UP of HBCUs and other African American-serving institutions that Dr. Hilborn agreed to explore this further. During his closing comments, Dr. Fleming Crim, Chair of the Committee on Professional Training, reminded workshop participants of their common goal in increasing the number of African American baccalaureate degree recipients in chemistry in the United States. While acknowledging the variety of stakeholders in achieving this goal, he noted that if the ACS-approved chemistry department is to be used as the benchmark of program excellence, then CPT would necessarily play a lead role in any activity. He sincerely thanked workshop participants for their time and thoughts on this important topic. He proposed that the appropriate next step would be for CPT to consider carefully all of the recommendations emanating from this workshop. He further promised that CPT would formally forward recommendations outside their purview to the appropriate governance groups within ACS and that it would continue to engage the community of HBCUs and other African American-serving institutions in future discussions on these topics. Finally, he noted that a formal report on this workshop would be prepared and circulated to participants before being presented to the ACS Board of Directors.

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17. For a full description of activities of the ACS Board Task Force on Minorities in Academe, see the

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APPENDIX A

The ACS Committee on Professional Training Workshop on Increasing Participation of African American Undergraduates in Chemistry and Increasing ACS-Approved Chemistry Programs at Historically Black Colleges and Universities and African American-Serving Institutions

November 13-14, 2004

Participants

CPT Members & ACS Staff

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Dr. Joseph S. Francisco	Purdue University and CPT
Dr. Carlos G. Gutierrez	California State University–Los Angeles and CPT
Dr. Charles E. Carraher	Florida Atlantic University and CPT
Dr. F. Fleming Crim	University of Wisconsin and CPT (Chair)
Dr. William F. Polik	Hope College and CPT
Ms. Cathy Nelson	ACS
Mr. Matt Thompson	ACS
Mr. Darrell Alexander	ACS
Ms. LaTrease Garrison	ACS
Dr. Mary Kirchhoff	ACS

Institutional Representatives

Dr. Troy Stewart, Chair	Alcorn State University (MS)
Dr. David R. Kanis	Chicago State University (IL)
Dr. Hossein Nanaie	Claflin University (SC)
Dr. Issafu Harruna	Clark-Atlanta University (GA)
Dr. Princilla Evans, Chair	Fisk University (TN)
Dr. Ralph Turner	Florida A&M University (FL)
Dr. Isai Urasa, Chair	Hampton University (VA)
Dr. Naomi Campbell	Jackson State University (MS)
Dr. John Hall, Chair	Morehouse College (GA)
Dr. Alvin Kennedy, Chair	Morgan State University (MD)
Dr. Kenneth Hicks, Immediate Past Chair	Norfolk State University (VA)
Dr. Saundra F. DeLauder, Chair	North Carolina Central University (NC)
Dr. Aderemi Oki, Chair	Prairie View A&M University (TX)
Dr. George Williams, Dean, Graduate Studies & Sponsored Research	Savannah State University (GA)
Dr. Ella Kelley, Chair	Southern University and A&M College (LA)

Dr. Cornelia Gillyard, Immediate Past Chair	Spelman College (GA)
Dr. John Sapp, Chair	Texas Southern University (TX)
Dr. Gregory Pritchett, Chair	Tuskegee University (AL)
<u>Other Invited Guests</u>	
Dr. Billy Joe Evans	University of Michigan (retired)
Dr. Frederick Humphries	Florida A&M
<u>National Task Force on Undergraduate Physics</u>	
Dr. Robert Hilborn, Chair	Amherst College
<u>NOBCCChE</u>	
Dr. Marquita Qualls, President	GlaxoSmithKline
<u>Industry Representative</u>	
Dr. Chris Hollinsed	DuPont
<u>ACS Committee on Minority Affairs</u>	
Dr. Sandra McGuire, Chair	Louisiana State University
<u>ACS President</u>	
Dr. Charles P. Casey	University of Wisconsin
<u>ACS Executive Director</u>	
Ms. Madeleine Jacobs	ACS
<u>National Science Foundation</u>	
Dr. Arthur Ellis	National Science Foundation
Dr. Henry Blount	National Science Foundation
<u>Chemical & Engineering News Representative</u>	
Mr. Rudy Baum, Editor-in-Chief	ACS

APPENDIX B

The ACS Committee on Professional Training Workshop on Increasing Participation of African American Undergraduates in Chemistry and Increasing ACS-Approved Chemistry Programs at Historically Black Colleges and Universities and African American-Serving Institutions

AGENDA

Saturday, November 13

- 8:00 – 8:30 AM Continental Breakfast
- 8:30 – 8:40 AM Welcoming Remarks and Logistics
Dr. Jeanne E. Pemberton, CPT

Session 1: Challenges & Strategies in Recruiting & Retaining African American Undergraduates in Chemistry Dr. Joseph Francisco, Moderator

- 8:40 – 9:00 AM ***African Americans in the Chemistry Pipeline***
Dr. Joseph Francisco, CPT
- 9:00 – 9:20 AM Dr. Frederick Humphries, Florida A&M University
- 9:20 – 9:40 AM Dr. Saundra McGuire, Louisiana State University
- 9:40 – 10:00 AM Dr. Hossein Nanaie, Claflin University
- 10:00 – 10:15 AM Break
- 10:15 – 11:30 AM ***Breakout Session 1: Challenges & Strategies in Recruiting & Retaining African American Undergraduates in Chemistry***
- 11:30 AM – 12:00 Reports from Breakout Groups
- 12:00 – 12:15 PM Break for lunch set-up
- 12:15 – 1:15 PM Lunch

Session 2: Incentives & Barriers to ACS Approval of Undergraduate Chemistry Programs Dr. Carlos Gutierrez, Moderator

- 1:15 – 1:30 PM Welcoming Remarks
Madeleine Jacobs, Executive Director, ACS
- 1:30 – 1:50 PM ***ACS Approval: Why Is It Useful? Why Is It Important? The CPT Perspective*** Dr. Carlos Gutierrez, CPT
- 1:50 – 2:10 PM Dr. Ralph Turner, Florida A&M University
- 2:10 – 2:30 PM Dr. Cornelia Gillyard, Spelman College
- 2:30 – 2:50 PM Dr. David Kanis, Chicago State University

2:50 – 3:10 PM	Dr. George Williams, Savannah State University
3:10 – 3:30 PM	Break
3:30 – 4:45 PM	<i>Breakout Session 2: Incentives & Barriers to ACS Approval</i>
4:45 – 5:15 PM	Reports from Breakout Groups
5:15 – 5:45 PM	<i>Setting the Stage: Barriers to Increasing Participation by African-American Undergraduate Students in Chemistry & the Role of ACS Approval</i> Dr. F. Fleming Crim, Moderator
5:45 – evening	Dinner in small groups on your own

Sunday, November 14

Session 3: Strategies for Increasing Participation of African American Undergraduates in Chemistry and Increasing ACS-Approved Chemistry Programs at HBCUs and African American-Serving Institutions Dr. Jeanne E. Pemberton, Moderator

8:15 – 8:45 AM	Breakfast
8:45 – 9:15 AM	<i>The AAPT Four-Year Degree SPIN-UP Study: A Model from Physics</i> Dr. Robert Hilborn, National Task Force on Undergraduate Physics, Chair
9:15 – 9:25 AM	SPIN-UP Questions & Discussion
9:25 – 10:45 AM	<i>Breakout Session 3: Recommendations for Action for ACS and CPT on Increasing Participation of African American Undergraduate Students in Chemistry and Increasing ACS-Approved Chemistry Programs at HBCUs and African American-Serving Institutions</i>
10:45 – 11:00 AM	Break
11:00 – 11:30 AM	Reports from Breakout Groups
11:30 – 12:00 PM	<i>Workshop Wrap-Up: Final Recommendations to ACS & CPT</i>
12:15 PM	Adjourn (Take a box lunch for the road!)

APPENDIX C

CPT Workshop Breakout Session Groups

November 13-14, 2004

Breakout Session 1: SATURDAY MORNING

Group 1

Blount
Evans, B.J.
Evans, P.
Francisco (L)
Hicks
Kelley
Stewart
Thompson (S)

Group 2

Campbell
DeLauder
Gillyard
Gutierrez (L)
Humphries
Kanis
McGuire
Nelson (S)
Turner

Group 3

Alexander (S)
Casey
Hall
Hilborn
Hollinsed
Kennedy, D.
Nanaie
Oki
Polik (L)
Sapp

Group 4

Carraher
Crim (L)
Ellis
Garrison (S)
Harruna
Kennedy, A.
Pritchett
Qualls
Urasa
Williams

Breakout Session 2: SATURDAY AFTERNOON

Group 1

Alexander (S)
Blount
DeLauder
Hall
Hicks
Oki
Polik (L)
Qualls
Turner

Group 2

Carraher
Casey
Evans, B.J.
Garrison (S)
Gutierrez (L)
Kelley
McGuire
Sapp
Urasa
Williams

Group 3

Campbell
Crim (L)
Gillyard
Hilborn
Hollinsed
Kanis
Nanaie
Nelson (S)
Stewart

Group 4

Ellis
Evans, P.
Francisco (L)
Harruna
Kennedy, A.
Kennedy, D.
Pritchett
Thompson (S)

Breakout Session 3: SUNDAY MORNING

Group 1

Casey
Crim (L)
Harruna
Hilborn
Kennedy, A.
Nelson (S)
Pritchett
Urasa
Williams

Group 2

Ellis
Hall
Kennedy, D.
McGuire
Oki
Polik (L)
Qualls
Sapp
Thompson (S)

Group 3

Alexander (S)
Campbell
DeLauder
Evans, B.J.
Francisco (L)
Gillyard
Hollinsed
Kanis
Turner

Group 4

Blount
Carraher
Evans, P.
Kirchhoff (S)
Gutierrez (L)
Hicks
Kelley
Stewart

(L) = Leader

(S) = Scribe

NOTES
