

In 2002, at a crucial juncture on the path to war, senior members of the Bush administration gave a series of speeches and interviews in which they asserted that Saddam Hussein was rebuilding his nuclear weapons program. Speaking to a group of Wyoming Republicans in September, Vice President Dick Cheney said the United States now had "irrefutable evidence" -- thousands of tubes made of high-strength aluminum, tubes that the Bush administration said were destined for clandestine Iraqi uranium centrifuges, before some were seized at the behest of the United States.

Those tubes became a critical exhibit in the administration's brief against Iraq. As the only physical evidence the United States could brandish of Mr. Hussein's revived nuclear ambitions, they gave credibility to the apocalyptic imagery invoked by President Bush and his advisers. The tubes were "only really suited for nuclear weapons programs," Condoleezza Rice, the president's national security adviser, explained on CNN on Sept. 8, 2002. "We don't want the smoking gun to be a mushroom cloud."

But almost a year before, Ms. Rice's staff had been told that the government's foremost nuclear experts seriously doubted that the tubes were for nuclear weapons, according to four officials at the Central Intelligence Agency and two senior administration officials, all of whom spoke on condition of anonymity. The experts, at the Energy Department, believed the tubes were likely intended for small artillery rockets.

The White House, though, embraced the disputed theory that the tubes were for nuclear centrifuges, an idea first championed in April 2001 by a junior analyst at the C.I.A. Senior nuclear scientists considered that notion implausible, yet in the months after 9/11, as the administration built a case for confronting Iraq, the centrifuge theory gained currency as it rose to the top of the government.

Senior administration officials repeatedly failed to fully disclose the contrary views of America's leading nuclear scientists, an examination by The New York Times has found. They sometimes overstated even the most dire intelligence assessments of the tubes, yet minimized or rejected the strong doubts of nuclear experts. They worried privately that the nuclear case was weak, but expressed sober certitude in public.

One result was a largely one-sided presentation to the public that did not convey the depth of evidence and argument against the administration's most tangible proof of a revived nuclear weapons program in Iraq.

Today, 18 months after the invasion of Iraq, investigators there have found no evidence of hidden centrifuges or a revived nuclear weapons program. The absence of unconventional weapons in Iraq is now widely seen as evidence of a profound intelligence failure, of an intelligence community blinded by "group think," false assumptions and unreliable human sources.

Yet the tale of the tubes, pieced together through records and interviews with senior intelligence officers, nuclear experts, administration officials and Congressional investigators, reveals a different failure.

Far from "group think," American nuclear and intelligence experts argued bitterly over the tubes. A "holy war" is how one Congressional investigator described it. But if the opinions of the nuclear experts were seemingly disregarded at every turn, an overwhelming momentum gathered behind the C.I.A. assessment. It was a momentum built on a pattern of haste, secrecy, ambiguity, bureaucratic maneuver and a persistent failure in the Bush administration and among both Republicans and Democrats in Congress to ask hard questions.

Precisely how knowledge of the intelligence dispute traveled through the upper reaches of the administration is unclear. Ms. Rice knew about the debate before her Sept. 2002 CNN appearance, but only learned of the alternative rocket theory of the tubes soon afterward, according to two senior administration officials. President Bush learned of the debate at roughly the same time, a senior administration official said.

Last week, when asked about the tubes, administration officials said they relied on repeated assurances by George J. Tenet, then the director of central intelligence, that the tubes were in fact for centrifuges. They also noted that the intelligence community, including the Energy Department, largely agreed that Mr. Hussein had revived his nuclear program.

"These judgments sometimes require members of the intelligence community to

make tough assessments about competing interpretations of facts," said Sean McCormack, a spokesman for the president.

Mr. Tenet declined to be interviewed. But in a statement, he said he "made it clear" to the White House "that the case for a possible nuclear program in Iraq was weaker than that for chemical and biological weapons." Regarding the tubes, Mr. Tenet said "alternative views were shared" with the administration after the intelligence community drafted a new National Intelligence Estimate in late September 2002.

The tubes episode is a case study of the intersection between the politics of pre-emption and the inherent ambiguity of intelligence. The tubes represented a scientific puzzle and rival camps of experts clashed over the tiniest technical details in secure rooms in Washington, London and Vienna. The stakes were high, and they knew it.

So did a powerful vice president who saw in 9/11 horrifying confirmation of his long-held belief that the United States too often naively underestimates the cunning and ruthlessness of its foes.

"We have a tendency -- I don't know if it's part of the American character -- to say, 'Well, we'll sit down and we'll evaluate the evidence, we'll draw a conclusion,'" Mr. Cheney said as he discussed the tubes in September 2002 on the NBC News program "Meet the Press."

"But we always think in terms that we've got all the evidence," he said. "Here, we don't have all the evidence. We have 10 percent, 20 percent, 30 percent. We don't know how much. We know we have a part of the picture. And that part of the picture tells us that he is, in fact, actively and aggressively seeking to acquire nuclear weapons."

Joe Raises the Tube Issue

Throughout the 1990's, United States intelligence agencies were deeply preoccupied with the status of Iraq's nuclear weapons program, and with good reason.

After the Persian Gulf war in 1991, arms inspectors discovered that Iraq had been far

closer to building an atomic bomb than even the worst-case estimates had envisioned. And no one believed that Saddam Hussein had abandoned his nuclear ambitions. To the contrary, in one secret assessment after another, the agencies concluded that Iraq was conducting low-level theoretical research and quietly plotting to resume work on nuclear weapons.

But at the start of the Bush administration, the intelligence agencies also agreed that Iraq had not in fact resumed its nuclear weapons program. Iraq's nuclear infrastructure, they concluded, had been dismantled by sanctions and inspections. In short, Mr. Hussein's nuclear ambitions appeared to have been contained.

Then Iraq started shopping for tubes.

According to a 511-page report on flawed prewar intelligence by the Senate Intelligence Committee, the agencies learned in early 2001 of a plan by Iraq to buy 60,000 high-strength aluminum tubes from Hong Kong.

The tubes were made from 7075-T6 aluminum, an extremely hard alloy that made them potentially suitable as rotors in a uranium centrifuge. Properly designed, such tubes are strong enough to spin at the terrific speeds needed to convert uranium gas into enriched uranium, an essential ingredient of an atomic bomb. For this reason, international rules prohibited Iraq from importing certain sizes of 7075-T6 aluminum tubes; it was also why a new C.I.A. analyst named Joe quickly sounded the alarm.

At the C.I.A.'s request, The Times agreed to use only Joe's first name; the agency said publishing his full name could hinder his ability to operate overseas.

Joe graduated from the University of Kentucky in the late 1970's with a bachelor's degree in mechanical engineering, then joined the Goodyear Atomic Corporation, which dispatched him to Oak Ridge, Tenn., a federal complex that specializes in uranium and national security research.

Joe went to work on a new generation of centrifuges. Many European models stood no more than 10 feet tall. The American centrifuges loomed 40 feet high, and Joe's job was to learn how to test and operate them. But when the project was canceled in

1985, Joe spent the next decade performing hazard analyses for nuclear reactors, gaseous diffusion plants and oil refineries.

In 1997, Joe transferred to a national security complex at Oak Ridge known as Y-12, his entry into intelligence work. His assignment was to track global sales of material used in nuclear arms. He retired after two years, taking a buyout with hundreds of others at Oak Ridge, and moved to the C.I.A.

The agency's ability to assess nuclear intelligence had markedly declined after the cold war, and Joe's appointment was part of an effort to regain lost expertise. He was assigned to a division eventually known as Winpac, for Weapons Intelligence, Nonproliferation and Arms Control. Winpac had hundreds of employees, but only a dozen or so with a technical background in nuclear arms and fuel production. None had Joe's hands-on experience operating centrifuges.

Suddenly, Joe's work was ending up in classified intelligence reports being read in the White House. Indeed, his analysis was the primary basis for one of the agency's first reports on the tubes, which went to senior members of the Bush administration on April 10, 2001. The tubes, the report asserted, "have little use other than for a uranium enrichment program."

This alarming assessment was immediately challenged by the Energy Department, which builds centrifuges and runs the government's nuclear weapons complex.

The next day, Energy Department officials ticked off a long list of reasons why the tubes did not appear well suited for centrifuges. Simply put, the analysis concluded that the tubes were the wrong size -- too narrow, too heavy, too long -- to be of much practical use in a centrifuge.

What was more, the analysis reasoned, if the tubes were part of a secret, high-risk venture to build a nuclear bomb, why were the Iraqis haggling over prices with suppliers all around the world? And why weren't they shopping for all the other sensitive equipment needed for centrifuges?

All fine questions. But if the tubes were not for a centrifuge, what were they for?

Within weeks, the Energy Department experts had an answer.

It turned out, they reported, that Iraq had for years used high-strength aluminum tubes to make combustion chambers for slim rockets fired from launcher pods. Back in 1996, inspectors from the International Atomic Energy Agency had even examined some of those tubes, also made of 7075-T6 aluminum, at a military complex, the Nasser metal fabrication plant in Baghdad, where the Iraqis acknowledged making rockets. According to the international agency, the rocket tubes, some 66,000 of them, were 900 millimeters in length, with a diameter of 81 millimeters and walls 3.3 millimeters thick.

The tubes now sought by Iraq had precisely the same dimensions -- a perfect match.

That finding was published May 9, 2001, in the Daily Intelligence Highlight, a secret Energy Department newsletter published on Intelink, a Web site for the intelligence community and the White House.

Joe and his Winpac colleagues at the C.I.A. were not persuaded. Yes, they conceded, the tubes could be used as rocket casings. But that made no sense, they argued in a new report, because Iraq wanted tubes made at tolerances that "far exceed any known conventional weapons." In other words, Iraq was demanding a level of precision craftsmanship unnecessary for ordinary mass-produced rockets.

More to the point, those analysts had hit on a competing theory: that the tubes' dimensions matched those used in an early uranium centrifuge developed in the 1950's by a German scientist, Gernot Zippe. Most centrifuge designs are highly classified; this one, though, was readily available in science reports.

Thus, well before Sept. 11, 2001, the debate within the intelligence community was already neatly framed: Were the tubes for rockets or centrifuges?

Experts Attack Joe's Case

It was a simple question with enormous implications. If Mr. Hussein acquired nuclear weapons, American officials feared, he would wield them to menace the Middle East.

So the tube question was critical, yet none too easy to answer. The United States had few spies in Iraq, and certainly none who knew Mr. Hussein's plans for the tubes.

But the tubes themselves could yield many secrets. A centrifuge is an intricate device. Not any old tube would do. Careful inquiry might answer the question.

The intelligence community embarked on an ambitious international operation to intercept the tubes before they could get to Iraq. The big break came in June 2001: a shipment was seized in Jordan.

At the Energy Department, those examining the tubes included scientists who had spent decades designing and working on centrifuges, and intelligence officers steeped in the tricky business of tracking the nuclear ambitions of America's enemies. They included Dr. Jon A. Kreykes, head of Oak Ridge's national security advanced technology group; Dr. Duane F. Starr, an expert on nuclear proliferation threats; and Dr. Edward Von Halle, a retired Oak Ridge nuclear expert. Dr. Houston G. Wood III, a professor of engineering at the University of Virginia who had helped design the 40-foot American centrifuge, advised the team and consulted with Dr. Zippe.

On questions about nuclear centrifuges, this was unambiguously the A-Team of the intelligence community, many experts say.

On Aug. 17, 2001, weeks before the twin towers fell, the team published a secret Technical Intelligence Note, a detailed analysis that laid out its doubts about the tubes' suitability for centrifuges.

First, in size and material, the tubes were very different from those Iraq had used in its centrifuge prototypes before the first gulf war. Those models used tubes that were nearly twice as wide and made of exotic materials that performed far better than aluminum. "Aluminum was a huge step backwards," Dr. Wood recalled.

In fact, the team could find no centrifuge machines "deployed in a production environment" that used such narrow tubes. Their walls were three times too thick for "favorable use" in a centrifuge, the team wrote. They were also anodized, meaning they had a special coating to protect them from weather. Anodized tubes, the team

pointed out, are "not consistent" with a uranium centrifuge because the coating can produce bad reactions with uranium gas.

In other words, if Joe and his Winpac colleagues were right, it meant that Iraq had chosen to forsake years of promising centrifuge work and instead start from scratch, with inferior material built to less-than-optimal dimensions.

The Energy Department experts did not think that made much sense. They concluded that using the tubes in centrifuges "is credible but unlikely, and a rocket production is the much more likely end use for these tubes." Similar conclusions were being reached by Britain's intelligence service and experts at the International Atomic Energy Agency, a United Nations body.

Unlike Joe, experts at the international agency had worked with Zippe centrifuges, and they spent hours with him explaining why they believed his analysis was flawed. They pointed out errors in his calculations. They noted design discrepancies. They also sent reports challenging the centrifuge claim to American government experts through the embassy in Vienna, a senior official said.

Likewise, Britain's experts believed the tubes would need "substantial re-engineering" to work in centrifuges, according to Britain's review of its prewar intelligence. Their experts found it "paradoxical" that Iraq would order such finely crafted tubes only to radically rebuild each one for a centrifuge. Yes, it was theoretically possible, but as an Energy Department analyst later told Senate investigators, it was also theoretically possible to "turn your new Yugo into a Cadillac."

In late 2001, intelligence analysts at the State Department also took issue with Joe's work in reports prepared for Secretary of State Colin L. Powell. Joe was "very convinced, but not very convincing," recalled Greg Thielmann, then director of strategic, proliferation and military affairs in the Bureau of Intelligence and Research.

By year's end, Energy Department analysts published a classified report that even more firmly rejected the theory that the tubes could work as rotors in a 1950's Zippe centrifuge. These particular Zippe centrifuges, they noted, were especially ill suited for bomb making. The machines were a prototype designed for laboratory

experiments and meant to be operated as single units. To produce enough enriched uranium to make just one bomb a year, Iraq would need up to 16,000 of them working in concert, a challenge for even the most sophisticated centrifuge plants.

Iraq had never made more than a dozen centrifuge prototypes. Half failed when rotors broke. Of the rest, one actually worked to enrich uranium, Dr. Mahdi Obeidi, who once ran Iraq's centrifuge program, said in an interview last week.

The Energy Department team concluded it was "unlikely that anyone" could build a centrifuge site capable of producing significant amounts of enriched uranium "based on these tubes." One analyst summed it up this way: the tubes were so poorly suited for centrifuges, he told Senate investigators, that if Iraq truly wanted to use them this way, "we should just give them the tubes."

Enter Cheney

In the months after Sept. 11, 2001, as the Bush administration devised a strategy to fight Al Qaeda, Vice President Cheney immersed himself in the world of top-secret threat assessments. Bob Woodward, in his book "Plan of Attack," described Mr. Cheney as the administration's new "self-appointed special examiner of worst-case scenarios," and it was a role that fit.

Mr. Cheney had grappled with national security threats for three decades, first as President Gerald R. Ford's chief of staff, later as secretary of defense for the first President Bush. He was on intimate terms with the intelligence community, 15 spy agencies that frequently feuded over the significance of raw intelligence. He knew well their record of getting it wrong (the Bay of Pigs) and underestimating threats (Mr. Hussein's pre-1991 nuclear program) and failing to connect the dots (Sept. 11).

As a result, the vice president was not simply a passive recipient of intelligence analysis. He was known as a man who asked hard, skeptical questions, a man who paid attention to detail. "In my office I have a picture of John Adams, the first vice president," Mr. Cheney said in one of his first speeches as vice president. "Adams liked to say, 'The facts are stubborn things.' Whatever the issue, we are going to deal

with facts and show a decent regard for other points of view."

With the Taliban routed in Afghanistan after Sept. 11, Mr. Cheney and his aides began to focus on intelligence assessments of Saddam Hussein. Mr. Cheney had long argued for more forceful action to topple Mr. Hussein. But in January 2002, according to Mr. Woodward's book, the C.I.A. told Mr. Cheney that Mr. Hussein could not be removed with covert action alone. His ouster, the agency said, would take an invasion, which would require persuading the public that Iraq posed a threat to the United States.

The evidence for that case was buried in classified intelligence files. Mr. Cheney and his aides began to meet repeatedly with analysts who specialized in Iraq and unconventional weapons. They wanted to know about any Iraqi ties to Al Qaeda and Baghdad's ability to make unconventional weapons.

"There's no question they had a point of view, but there was no attempt to get us to hew to a particular point of view ourselves, or to come to a certain conclusion," the deputy director of analysis at Winpac told the Senate Intelligence Committee. "It was trying to figure out, why do we come to this conclusion, what was the evidence. A lot of questions were asked, probing questions."

Of all the worst-case possibilities, the most terrifying was the idea that Mr. Hussein might slip a nuclear weapon to terrorists, and Mr. Cheney and his staff zeroed in on Mr. Hussein's nuclear ambitions.

Mr. Cheney, for example, read a Feb. 12, 2002, report from the Defense Intelligence Agency about Iraq's reported attempts to buy 500 tons of yellowcake, a uranium concentrate, from Niger, according to the Senate Intelligence Committee report. Many American intelligence analysts did not put much stock in the Niger report. Mr. Cheney pressed for more information.

At the same time, a senior intelligence official said, the agency was fielding repeated requests from Mr. Cheney's office for intelligence about the tubes, including updates on Iraq's continuing efforts to procure thousands more after the seizure in Jordan.

"Remember," Dr. David A. Kay, the chief American arms inspector after the war, said in an interview, "the tubes were the only piece of physical evidence about the Iraqi weapons programs that they had."

In March 2002, Mr. Cheney traveled to Europe and the Middle East to build support for a confrontation with Iraq. It is not known whether he mentioned Niger or the tubes in his meetings. But on his return, he made it clear that he had repeatedly discussed Mr. Hussein and the nuclear threat.

"He is actively pursuing nuclear weapons at this time," Mr. Cheney asserted on CNN.

At the time, the C.I.A. had not reached so firm a conclusion. But on March 12, the day Mr. Cheney landed in the Middle East, he and other senior administration officials had been sent two C.I.A. reports about the tubes. Each cited the tubes as evidence that "Iraq currently may be trying to reconstitute its gas centrifuge program."

Neither report, however, mentioned that leading centrifuge experts at the Energy Department strongly disagreed, according to Congressional officials who have read the reports.

What White House Is Told

As the Senate Intelligence Committee report made clear, the American intelligence community "is not a level playing field when it comes to the competition of ideas in intelligence analysis."

The C.I.A. has a distinct edge: "unique access to policy makers and unique control of intelligence reporting," the report found. The Presidential Daily Briefs, for example, are prepared and presented by agency analysts; the agency's director is the president's principal intelligence adviser. This allows agency analysts to control the presentation of information to policy makers "without having to explain dissenting views or defend their analysis from potential challenges," the committee's report said.

This problem, the report said, was "particularly evident" with the C.I.A.'s analysis of the tubes, when agency analysts "lost objectivity and in several cases took action that

improperly excluded useful expertise from the intelligence debate." In interviews, Senate investigators said the agency's written assessments did a poor job of describing the debate over the intelligence.

From April 2001 to September 2002, the agency wrote at least 15 reports on the tubes. Many were sent only to high-level policy makers, including President Bush, and did not circulate to other intelligence agencies. None have been released, though some were described in the Senate's report.

Several senior C.I.A. officials insisted that those reports did describe at least in general terms the intelligence debate. "You don't go into all that detail but you do try to evince it when you write your current product," one agency official said.

But several Congressional and intelligence officials with access to the 15 assessments said not one of them informed senior policy makers of the Energy Department's dissent. They described a series of reports, some with ominous titles, that failed to convey either the existence or the substance of the intensifying debate.

Over and over, the reports restated Joe's main conclusions for the C.I.A. -- that the tubes matched the 1950's Zippe centrifuge design and were built to specifications that "exceeded any known conventional weapons application." They did not state what Energy Department experts had noted -- that many common industrial items, even aluminum cans, were made to specifications as good or better than the tubes sought by Iraq. Nor did the reports acknowledge a significant error in Joe's claim -- that the tubes "matched" those used in a Zippe centrifuge.

The tubes sought by Iraq had a wall thickness of 3.3 millimeters. When Energy Department experts checked with Dr. Zippe, a step Joe did not take, they learned that the walls of Zippe tubes did not exceed 1.1 millimeters, a substantial difference.

"They never lay out the other case," one Congressional official said of those C.I.A. assessments.

The Senate report provides only a partial picture of the agency's communications with the White House. In an arrangement endorsed by both parties, the Intelligence

Committee agreed to delay an examination of whether White House descriptions of Iraq's military capabilities were "substantiated by intelligence information." As a result, Senate investigators were not permitted to interview White House officials about what they knew of the tubes debate and when they knew it.

But in interviews, C.I.A. and administration officials disclosed that the dissenting views were repeatedly discussed in meetings and telephone calls.

One senior official at the agency said its "fundamental approach" was to tell policy makers about dissenting views. Another senior official acknowledged that some of their agency's reports "weren't as well caveated as, in retrospect, they should have been." But he added, "There was certainly nothing that was hidden."

Four agency officials insisted that Winpac analysts repeatedly explained the contrasting assessments during briefings with senior National Security Council officials who dealt with nuclear proliferation issues. "We think we were reasonably clear about this," a senior C.I.A. official said.

A senior administration official confirmed that Winpac was indeed candid about the differing views. The official, who recalled at least a half dozen C.I.A. briefings on tubes, said he knew by late 2001 that there were differing views on the tubes. "To the best of my knowledge, he never hid anything from me," the official said of his counterpart at Winpac.

This official said he also spoke to senior officials at the Department of Energy about the tubes, and a spokeswoman for the department said in a written statement that the agency "strongly conveyed its viewpoint to senior policy makers."

But if senior White House officials understood the department's main arguments against the tubes, they also took into account its caveats. "As far as I know," the senior administration official said, "D.O.E. never concluded that these tubes could not be used for centrifuges."

A Referee Is Ignored

Over the summer of 2002, the White House secretly refined plans to invade Iraq and debated whether to seek more United Nations inspections. At the same time, in response to a White House request in May, C.I.A. officials were quietly working on a report that would lay out for the public declassified evidence of Iraq's reported unconventional weapons and ties to terror groups.

That same summer the tubes debate continued to rage. The primary antagonists were the C.I.A. and the Energy Department, with other intelligence agencies drawn in on either side.

Much of the strife centered on Joe. At first glance, he seemed an unlikely target. He held a relatively junior position, and according to the C.I.A. he did not write the vast majority of the agency's reports on the tubes. He has never met Mr. Cheney. His one trip to the White House was to take his family on the public tour.

But he was, as one staff member on the Senate Intelligence Committee put it, "the ringleader" of a small group of Winpac analysts who were convinced that the tubes were destined for centrifuges. His views carried special force within the agency because he was the only Winpac analyst with experience operating uranium centrifuges. In meetings with other intelligence agencies, he often took the lead in arguing the technical basis for the agency's conclusions.

"Very few people have the technical knowledge to independently arrive at the conclusion he did," said Dr. Kay, the weapons inspector, when asked to explain Joe's influence.

Without identifying him, the Senate Intelligence Committee's report repeatedly questioned Joe's competence and integrity. It portrayed him as so determined to prove his theory that he twisted test results, ignored factual discrepancies and excluded dissenting views.

The Senate report, for example, challenged his decision not to consult the Energy Department on tests designed to see if the tubes were strong enough for centrifuges. Asked why he did not seek their help, Joe told the committee: "Because we funded it. It was our testing. We were trying to prove some things that we wanted to prove with

the testing." The Senate report singled out that comment for special criticism, saying, "The committee believes that such an effort should never have been intended to prove what the C.I.A. wanted to prove."

Joe's superiors strongly defend his work and say his words were taken out of context. They describe him as diligent and professional, an open-minded analyst willing to go the extra mile to test his theories. "Part of the job of being an analyst is to evaluate alternative hypotheses and possibilities, to build a case, think of alternatives," a senior agency official said. "That's what Joe did in this case. If he turned out to be wrong, that's not an offense. He was expected to be wrong occasionally."

Still, the bureaucratic infighting was by then so widely known that even the Australian government was aware of it. "U.S. agencies differ on whether aluminum tubes, a dual-use item sought by Iraq, were meant for gas centrifuges," Australia's intelligence services wrote in a July 2002 assessment. The same report said the tubes evidence was "patchy and inconclusive."

There was a mechanism, however, to resolve the dispute. It was called the Joint Atomic Energy Intelligence Committee, a secret body of experts drawn from across the federal government. For a half century, Jaeic (pronounced jake) has been called on to resolve disputes and give authoritative assessments about nuclear intelligence. The committee had specifically assessed the Iraqi nuclear threat in 1989, 1997 and 1999. An Energy Department expert was the committee's chairman in 2002, and some department officials say the C.I.A. opposed calling in Jaeic to mediate the tubes fight.

Not so, agency officials said. In July 2002, they insist, they were the first intelligence agency to seek Jaeic's intervention. "I personally was concerned about the extent of the community's disagreement on this and the fact that we weren't getting very far," a senior agency official recalled.

The committee held a formal session in early August to discuss the debate, with more than a dozen experts on both sides in attendance. A second meeting was scheduled for later in August but was postponed. A third meeting was set for early September; it

never happened either.

"We were O.B.E. -- overcome by events," an official involved in the proceedings recalled.

White House Makes a Move

"The case of Saddam Hussein, a sworn enemy of our country, requires a candid appraisal of the facts," Mr. Cheney said on Aug. 26, 2002, at the outset of an address to the Veterans of Foreign Wars national convention in Nashville.

Warning against "wishful thinking or willful blindness," Mr. Cheney used the speech to lay out a rationale for pre-emptive action against Iraq. Simply resuming United Nations inspections, he argued, could give "false comfort" that Mr. Hussein was contained.

"We now know Saddam has resumed his efforts to acquire nuclear weapons," he declared, words that quickly made headlines worldwide. "Many of us are convinced that Saddam will acquire nuclear weapons fairly soon. Just how soon, we cannot really gauge. Intelligence is an uncertain business, even in the best of circumstances."

But the world, Mr. Cheney warned, could ill afford to once again underestimate Iraq's progress.

"Armed with an arsenal of these weapons of terror, and seated atop 10 percent of the world's oil reserves, Saddam Hussein could then be expected to seek domination of the entire Middle East, take control of a great portion of the world's energy supplies, directly threaten America's friends throughout the region, and subject the United States or any other nation to nuclear blackmail."

A week later President Bush announced that he would ask Congress for authorization to oust Mr. Hussein. He also met that day with senior members of the House and Senate, some of whom expressed concern that the administration had yet to show the American people tangible evidence of an imminent threat. The fact that Mr.

Hussein gassed his own people in the 1980's, they argued, was not sufficient evidence of a threat to the United States in 2002.

President Bush got the message. He directed Mr. Cheney to give the public and Congress a more complete picture of the latest intelligence on Iraq.

In his Nashville speech, Mr. Cheney had not mentioned the aluminum tubes or any other fresh intelligence when he said, "We now know that Saddam has resumed his efforts to acquire nuclear weapons." The one specific source he did cite was Hussein Kamel al-Majid, a son-in-law of Mr. Hussein's who defected in 1994 after running Iraq's chemical, biological and nuclear weapons programs. But Mr. Majid told American intelligence officials in 1995 that Iraq's nuclear program had been dismantled. What's more, Mr. Majid could not have had any insight into Mr. Hussein's current nuclear activities: he was assassinated in 1996 on his return to Iraq.

The day after President Bush announced he was seeking Congressional authorization, Mr. Cheney and Mr. Tenet, the director of central intelligence, traveled to Capitol Hill to brief the four top Congressional leaders. After the 90-minute session, J. Dennis Hastert, the House speaker, told Fox News that Mr. Cheney had provided new information about unconventional weapons, and Fox went on to report that one source said the new intelligence described "just how dangerously close Saddam Hussein has come to developing a nuclear bomb."

Tom Daschle, the South Dakota Democrat and Senate majority leader, was more cautious. "What has changed over the course of the last 10 years, that brings this country to the belief that it has to act in a pre-emptive fashion in invading Iraq?" he asked.

A few days later, on Sept. 8., the lead article on Page 1 of The New York Times gave the first detailed account of the aluminum tubes. The article cited unidentified senior administration officials who insisted that the dimensions, specifications and numbers of tubes sought showed that they were intended for a nuclear weapons program.

"The closer he gets to a nuclear capability, the more credible is his threat to use chemical and biological weapons," a senior administration official was quoted as

saying. "Nuclear weapons are his hole card."

The article gave no hint of a debate over the tubes.

The White House did much to increase the impact of The Times' article. The morning it was published, Mr. Cheney went on the NBC News program "Meet the Press" and confirmed when asked that the tubes were the most alarming evidence behind the administration's view that Iraq had resumed its nuclear weapons program. The tubes, he said, had "raised our level of concern." Ms. Rice, the national security adviser, went on CNN and said the tubes "are only really suited for nuclear weapons programs."

Neither official mentioned that the nation's top nuclear design experts believed overwhelmingly that the tubes were poorly suited for centrifuges.

Mr. Cheney, who has a history of criticizing officials who disclose sensitive information, typically refuses to comment when asked about secret intelligence. Yet on this day, with a Gallup poll showing that 58 percent of Americans did not believe President Bush had done enough to explain why the United States should act against Iraq, Mr. Cheney spoke openly about one of the closest held secrets regarding Iraq. Not only did Mr. Cheney draw attention to the tubes; he did so with a certitude that could not be found in even the C.I.A.'s assessments. On "Meet the Press," Mr. Cheney said he knew "for sure" and "in fact" and "with absolute certainty" that Mr. Hussein was buying equipment to build a nuclear weapon.

"He has reconstituted his nuclear program," Mr. Cheney said flatly.

But in the C.I.A. reports, evidence "suggested" or "could mean" or "indicates" -- a word used in a report issued just weeks earlier. Little if anything was asserted with absolute certainty. The intelligence community had not yet concluded that Iraq had indeed reconstituted its nuclear program.

"The vice president's public statements have reflected the evolving judgment of the intelligence community," Kevin Kellems, Mr. Cheney's spokesman, said in a written statement.

The C.I.A. routinely checks presidential speeches that draw on intelligence reports. This is how intelligence professionals pull politicians back from factual errors. One such opportunity came soon after Mr. Cheney's appearance on "Meet the Press." On Sept. 11, 2002, the White House asked the agency to clear for possible presidential use a passage on Iraq's nuclear program. The passage included this sentence: "Iraq has made several attempts to buy high-strength aluminum tubes used in centrifuges to enrich uranium for nuclear weapons."

The agency did not ask speechwriters to make clear that centrifuges were but one possible use, that intelligence experts were divided and that the tubes also matched those used in Iraqi rockets. In fact, according to the Senate's investigation, the agency suggested no changes at all.

The next day President Bush used virtually identical language when he cited the aluminum tubes in an address to the United Nations General Assembly.

Dissent, but to Little Effect

The administration's talk of clandestine centrifuges, nuclear blackmail and mushroom clouds had a powerful political effect, particularly on senators who were facing fall election campaigns. "When you hear about nuclear weapons, this is the national security knock-out punch," said Senator Ron Wyden, a Democrat from Oregon who sits on the Intelligence Committee and ultimately voted against authorizing war.

Even so, it did not take long for questions to surface over the administration's claims about Mr. Hussein's nuclear capabilities. As it happened, Senator Dianne Feinstein, another Democratic member of the Intelligence Committee, had visited the International Atomic Energy Agency in Vienna in August 2002. Officials there, she later recalled, told her they saw no signs of a revived nuclear weapons program in Iraq.

At that point, the tubes debate was in its 16th month. Yet Mr. Tenet, of the C.I.A., the man most responsible for briefing President Bush on intelligence, told the committee that he was unaware until that September of the profound disagreement over critical

evidence that Mr. Bush was citing to world leaders as justification for war.

Even now, committee members from both parties express baffled anger at this possibility. How could he not know? "I don't even understand it," Olympia Snowe, a Republican senator from Maine, said in an interview. "I cannot comprehend the failures in judgment or breakdowns in communication."

Mr. Tenet told Senate investigators that he did not expect to learn of dissenting opinions "until the issue gets joined" at the highest levels of the intelligence community. But if Mr. Tenet's lack of knowledge meant the president was given incomplete information about the tubes, there was still plenty of time for the White House to become fully informed.

Yet so far, Senate investigators say, they have found little evidence the White House tried to find out why so many experts disputed the C.I.A. tubes theory. If anything, administration officials minimized the divide.

On Sept. 13, The Times made the first public mention of the tubes debate in the sixth paragraph of an article on Page A13. In it an unidentified senior administration official dismissed the debate as a "footnote, not a split." Citing another unidentified administration official, the story reported that the "best technical experts and nuclear scientists at laboratories like Oak Ridge supported the C.I.A. assessments."

As a senior Oak Ridge official pointed out to the Intelligence Committee, "the vast majority of scientists and nuclear experts" in the Energy Department's laboratories in fact disagreed with the agency. But on Sept. 13, the day the article appeared, the Energy Department sent a directive forbidding employees from discussing the subject with reporters.

The Energy Department, in a written statement, said that it was "completely appropriate" to remind employees of the need to protect nuclear secrets and that it had made no effort "to quash dissent."

In closed hearings that month, though, Congress began to hear testimony about the debate. Several Democrats said in interviews that secrecy rules had prevented them

from speaking out about the gap between the administration's view of the tubes and the more benign explanations described in classified testimony.

One senior C.I.A. official recalled cautioning members of Congress in a closed session not to speak publicly about the possibility that the tubes were for rockets. "If people start talking about that and the Iraqis see that people are saying rocket bodies, that will automatically become their explanation whenever anyone goes to Iraq," the official said in an interview.

So while administration officials spoke freely about the agency's theory, the evidence that best challenged this view remained almost entirely off limits for public debate.

In late September, the C.I.A. sent policymakers its most detailed classified report on the tubes. For the first time, an agency report acknowledged that "some in the intelligence community" believed rockets were "more likely end uses" for the tubes, according to officials who have seen the report.

Meanwhile, at the Energy Department, scientists were startled to find senior White House officials embracing a view of the tubes they considered thoroughly discredited. "I was really shocked in 2002 when I saw it was still there," Dr. Wood, the Oak Ridge adviser, said of the centrifuge claim. "I thought it had been put to bed."

Members of the Energy Department team took a highly unusual step: They began working quietly with a Washington arms-control group, the Institute for Science and International Security, to help the group inform the public about the debate, said one team member and the group's president, David Albright.

On Sept. 23, the institute issued the first in series of lengthy reports that repeated some of the Energy Department's arguments against the C.I.A. analysis, though no classified ones. Still, after more than 16 months of secret debate, it was the first public airing of facts that undermined the most alarming suggestions about Iraq's nuclear threat.

The reports got little attention, partly because reporters did not realize they had been done with the cooperation of top Energy Department experts. The Washington Post

ran a brief article about the findings on Page A18. Many major newspapers, including The Times, ran nothing at all.

Scrambling for an 'Estimate'

Soon after Mr. Cheney's appearance on "Meet the Press," Democratic senators began pressing for a new National Intelligence Estimate on Iraq, terrorism and unconventional weapons. A National Intelligence Estimate is a classified document that is supposed to reflect the combined judgment of the entire intelligence community. The last such estimate had been done in 2000.

Most estimates take months to complete. But this one had to be done in days, in time for an October vote on a war resolution. There was little time for review or reflection, and no time for Jaeic, the joint committee, to reconcile deep analytical differences.

This was a potentially thorny obstacle for those writing the nuclear section: What do you do when the nation's nuclear experts strongly doubt the linchpin evidence behind the C.I.A.'s claims that Iraq was rebuilding its nuclear weapons program?

The Energy Department helped solve the problem. In meetings on the estimate, senior department intelligence officials said that while they still did not believe the tubes were for centrifuges, they nonetheless could agree that Iraq was reconstituting its nuclear weapons capability.

Several senior scientists inside the department said they were stunned by that stance; they saw no compelling evidence of a revived nuclear program.

Some laboratory officials blamed time pressure and inexperience. Thomas S. Ryder, the department's representative at the meetings, had been acting director of the department's intelligence unit for only five months. "A heck of a nice guy but not savvy on technical issues," is the way one senior nuclear official described Mr. Ryder, who declined comment.

Mr. Ryder's position was more alarming than prior assessments from the Energy Department. In an August 2001 intelligence paper, department analysts warned of

suspicious activities in Iraq that "could be preliminary steps" toward reviving a centrifuge program. In July 2002 an Energy Department report, "Nuclear Reconstitution Efforts Underway?", noted that several developments, including Iraq's suspected bid to buy yellowcake uranium from Niger, suggested Baghdad was "seeking to reconstitute" a nuclear weapons program.

According to intelligence officials who took part in the meetings, Mr. Ryder justified his department's now firm position on nuclear reconstitution in large part by citing the Niger reports. Many C.I.A. analysts considered that intelligence suspect, as did analysts at the State Department.

Nevertheless, the estimate's authors seized on the Energy Department's position to avoid the entire tubes debate, with written dissents relegated to a 10-page annex. The estimate would instead emphasize that the C.I.A. and the Energy Department both agreed that Mr. Hussein was rebuilding his nuclear weapons program. Only the closest reader would see that each agency was basing its assessment in large measure on evidence the other considered suspect.

On Oct. 2, nine days before the Senate vote on the war resolution, the new National Intelligence Estimate was delivered to the Intelligence Committee. The most significant change from past estimates dealt with nuclear weapons; the new one agreed with Mr. Cheney that Iraq was in aggressive pursuit of the atomic bomb.

Asked when Mr. Cheney became aware of the disagreements over the tubes, Mr. Kellems, his spokesman, said, "The vice president knew about the debate at about the time of the National Intelligence Estimate."

Today, the Intelligence Committee's report makes clear, that 93-page estimate stands as one of the most flawed documents in the history of American intelligence. The committee concluded unanimously that most of the major findings in the estimate were wrong, unfounded or overblown.

This was especially true of the nuclear section.

Estimates express their most important findings with high, moderate or low

confidence levels. This one claimed "moderate confidence" on how fast Iraq could have a bomb, but "high confidence" that Baghdad was rebuilding its nuclear program. And the tubes were the leading and most detailed evidence cited in the body of the report.

According to the committee, the passages on the tubes, which adopted much of the C.I.A. analysis, were misleading and riddled with factual errors.

The estimate, for example, included a chart intended to show that the dimensions of the tubes closely matched a Zippe centrifuge. Yet the chart omitted the dimensions of Iraq's 81-millimeter rocket, which precisely matched the tubes.

The estimate cited Iraq's alleged willingness to pay top dollar for the tubes, up to \$17.50 each, as evidence they were for secret centrifuges. But Defense Department rocket engineers told Senate investigators that 7075-T6 aluminum is "the material of choice for low-cost rocket systems."

The estimate also asserted that 7075-T6 tubes were "poor choices" for rockets. In fact, similar tubes were used in rockets from several countries, including the United States, and in an Italian rocket, the Medusa, which Iraq had copied.

Beyond tubes, the estimate cited several other "key judgments" that supported its assessment. The committee found that intelligence just as flawed.

The estimate, for example, pointed to Iraq's purchases of magnets, balancing machines and machine tools, all of which could be used in a nuclear program. But each item also had legitimate non-nuclear uses, and there was no credible intelligence whatsoever showing they were for a nuclear program.

The estimate said Iraq's Atomic Energy Commission was building new production facilities for nuclear weapons. The Senate found that claim was based on a single operative's report, which described how the commission had constructed one headquarters building and planned "a new high-level polytechnic school."

Finally, the estimate stated that many nuclear scientists had been reassigned to the A.E.C. The Senate found nothing to back that conclusion. It did, though, discover a

2001 report in which a commission employee complained that Iraq's nuclear program "had been stalled since the gulf war."

Such "key judgments" are supposed to reflect the very best American intelligence. (The Niger intelligence, for example, was considered too shaky to be included as a key judgment.) Yet as they studied raw intelligence reports, those involved in the Senate investigation came to a sickening realization. "We kept looking at the intelligence and saying, 'My God, there's nothing here,'" one official recalled.

The Vote for War

Soon after the National Intelligence Estimate was completed, Mr. Bush delivered a speech in Cincinnati in which he described the "grave threat" that Iraq and its "arsenal of terror" posed to the United States. He dwelled longest on nuclear weapons, reviewing much of the evidence outlined in the estimate. The C.I.A. had warned him away from mentioning Niger.

"Facing clear evidence of peril," the president concluded, "we cannot wait for the final proof -- the smoking gun -- that could come in the form of a mushroom cloud."

Four days later, on Oct. 11, the Senate voted 77-23 to give Mr. Bush broad authority to invade Iraq. The resolution stated that Iraq posed "a continuing threat" to the United States by, among other things, "actively seeking a nuclear weapons capability."

Many senators who voted for the resolution emphasized the nuclear threat.

"The great danger is a nuclear one," Senator Feinstein, the California Democrat, said on the Senate floor.

But Senator Bob Graham, then chairman of the Intelligence Committee, said he voted against the resolution in part because of doubts about the tubes. "It reinforced in my mind pre-existing questions I had about the unreliability of the intelligence community, especially the C.I.A.," Mr. Graham, a Florida Democrat, said in an interview.

At the Democratic convention in Boston this summer, Senator John Kerry pledged

that should he be elected president, "I will ask hard questions and demand hard evidence." But in October 2002, when the Senate voted on Iraq, Mr. Kerry had not read the National Intelligence Estimate, but instead had relied on a briefing from Mr. Tenet, a spokeswoman said. "According to the C.I.A.'s report, all U.S. intelligence experts agree that Iraq is seeking nuclear weapons," Mr. Kerry said then, explaining his vote. "There is little question that Saddam Hussein wants to develop nuclear weapons."

The report cited by Mr. Kerry, an unclassified white paper, said nothing about the tubes debate except that "some" analysts believed the tubes were "probably intended" for conventional arms.

"It is common knowledge that Congress does not have the same access as the executive branch," Brooke Anderson, a Kerry spokeswoman, said yesterday.

Mr. Kerry's running mate, Senator John Edwards, served on the Intelligence Committee, which gave him ample opportunity to ask hard questions. But in voting to authorize war, Mr. Edwards expressed no uncertainty about the principal evidence of Mr. Hussein's alleged nuclear program.

"We know that he is doing everything he can to build nuclear weapons," Mr. Edwards said then.

On Dec. 7, 2002, Iraq submitted a 12,200-page declaration about unconventional arms to the United Nations that made no mention of the tubes. Soon after, Winpac analysts at the C.I.A. assessed the declaration for President Bush. The analysts criticized Iraq for failing to acknowledge or explain why it sought tubes "we believe suitable for use in a gas centrifuge uranium effort." Nor, they said, did it "acknowledge efforts to procure uranium from Niger."

Neither Energy Department nor State Department intelligence experts were given a chance to review the Winpac assessment, prompting complaints that dissenting views were being withheld from policy makers.

"It is most disturbing that Winpac is essentially directing foreign policy in this matter,"

one Energy Department official wrote in an e-mail message. "There are some very strong points to be made in respect to Iraq's arrogant noncompliance with U.N. sanctions. However, when individuals attempt to convert those 'strong statements' into the 'knock-out' punch, the administration will ultimately look foolish -- i.e., the tubes and Niger!"

The U.N. Inspectors Return

For nearly two years Western intelligence analysts had been trying to divine from afar Iraq's plans for the tubes. At the end of 2002, with the resumption of United Nations arms inspections, it became possible to seek answers inside Iraq. Inspectors from the International Atomic Energy Agency immediately zeroed in on the tubes.

The team quickly arranged a field trip to the Nasser metal fabrication factory, where they found 13,000 completed rockets, all produced from 7075-T6 aluminum tubes. The Iraqi rocket engineers explained that they had been shopping for more tubes because their supply was running low.

Why order tubes with such tight tolerances? An Iraqi engineer said they wanted to improve the rocket's accuracy without making major design changes. Design documents and procurement records confirmed his account.

The inspectors solved another mystery. The tubes intercepted in Jordan had been anodized, given a protective coating. The Iraqis had a simple explanation: they wanted the new tubes protected from the elements. Sure enough, the inspectors found that many thousands of the older tubes, which had no special coating, were corroded because they had been stored outside.

The inspectors found no trace of a clandestine centrifuge program. On Jan. 10, 2003, The Times reported that the international agency was challenging "the key piece of evidence" behind "the primary rationale for going to war." The article, on Page A10, also reported that officials at the Energy Department and State Department had suggested the tubes might be for rockets.

The C.I.A. theory was in trouble, and senior members of the Bush administration

seemed to know it.

Also that January, White House officials who were helping to draft what would become Secretary Powell's speech to the Security Council sent word to the intelligence community that they believed "the nuclear case was weak," the Senate report said. In an interview, a senior administration official said it was widely understood all along at the White House that the evidence of a nuclear threat was piecemeal and weaker than that for other unconventional arms.

But rather than withdraw the nuclear card -- a step that could have undermined United States credibility just as tens of thousands of troops were being airlifted to the region -- the White House cast about for new arguments and evidence to support it.

Gen. Richard B. Myers, chairman of the Joint Chiefs of Staff, asked the intelligence agencies for more evidence beyond the tubes to bolster the nuclear case. Winpac analysts redoubled efforts to prove that Iraq was trying to acquire uranium from Africa. When rocket engineers at the Defense Department were approached by the C.I.A. and asked to compare the Iraqi tubes with American ones, the engineers said the tubes "were perfectly usable for rockets." The agency analysts did not appear pleased. One rocket engineer complained to Senate investigators that the analysts had "an agenda" and were trying "to bias us" into agreeing that the Iraqi tubes were not fit for rockets. In interviews, agency officials denied any such effort.

According to the Intelligence Committee report, the agency also sought to undermine the I.A.E.A.'s work with secret intelligence assessments distributed only to senior policy makers. Nonetheless, on Jan. 22, in a meeting first reported by The Washington Post, the ubiquitous Joe flew to Vienna in a last-ditch attempt to bring the international experts around to his point of view.

The session was a disaster.

"Everybody was embarrassed when he came and made this presentation, embarrassed and disgusted," one participant said. "We were going insane, thinking, 'Where is he coming from?'"

On Jan. 27, the international agency rendered its judgment: it told the Security Council that it had found no evidence of a revived nuclear weapons program in Iraq. "From our analysis to date," the agency reported, "it appears that the aluminum tubes would be consistent with the purpose stated by Iraq and, unless modified, would not be suitable for manufacturing centrifuges."

The Powell Presentation

The next night, during his State of the Union address, President Bush cited I.A.E.A. findings from years past that confirmed that Mr. Hussein had had an "advanced" nuclear weapons program in the 1990's. He did not mention the agency's finding from the day before.

He did, though, repeat the claim that Mr. Hussein was trying to buy tubes "suitable for nuclear weapons production." Mr. Bush also cited British intelligence that Mr. Hussein had recently sought "significant quantities" of uranium from Africa -- a reference in 16 words that the White House later said should have been stricken, though the British government now insists the information was credible.

"Saddam Hussein," Mr. Bush said that night, "has not credibly explained these activities. He clearly has much to hide. The dictator of Iraq is not disarming."

A senior administration official involved in vetting the address said Mr. Bush did not cite the I.A.E.A. conclusion of Jan. 27 because the White House believed the agency was analyzing old Iraqi tubes, not the newer ones seized in Jordan. But senior officials in Vienna and Washington said the international group's analysis covered both types of tubes.

The senior administration official also said the president's words were carefully chosen to reflect the doubts at the Energy Department. The crucial phrase was "suitable for nuclear weapons production." The phrase stopped short of asserting that the tubes were actually being used in centrifuges. And it was accurate in the sense that Energy Department officials always left open the possibility that the tubes could be modified for use in a centrifuge.

"There were differences," the official said, "and we had to address those differences."

In his address, the president announced that Mr. Powell would go before the Security Council on Feb. 5 and lay out the intelligence on Iraq's weapons programs. The purpose was to win international backing for an invasion, and so the administration spent weeks drafting and redrafting the presentation, with heavy input from the C.I.A., the National Security Council and I. Lewis Libby, Mr. Cheney's chief of staff.

The Intelligence Committee said some drafts prepared for Mr. Powell contained language on the tubes that was patently incorrect. The C.I.A. wanted Mr. Powell to say, for example, that Iraq's specifications for roundness were so exacting "that the tubes would be rejected as defective if I rolled one under my hand on this table, because the mere pressure of my hand would deform it."

Intelligence analysts at the State Department waged a quiet battle against much of the proposed language on tubes. A year before, they had sent Mr. Powell a report explaining why they believed the tubes were more likely for rockets. The National Intelligence Estimate included their dissent -- that they saw no compelling evidence of a comprehensive effort to revive a nuclear weapons program. Now, in the days before the Security Council speech, they sent the secretary detailed memos warning him away from a long list of assertions in the drafts, the intelligence committee found. The language on the tubes, they said, contained "egregious errors" and "highly misleading" claims. Changes were made, language softened. The line about "the mere pressure of my hand" was removed.

"My colleagues," Mr. Powell assured the Security Council, "every statement I make today is backed up by sources, solid sources. These are not assertions."

He made his way to the subject of Mr. Hussein's current nuclear capabilities.

"By now," he said, "just about everyone has heard of these tubes, and we all know there are differences of opinion. There is controversy about what these tubes are for. Most U.S. experts think they are intended to serve as rotors in centrifuges used to enrich uranium. Other experts and the Iraqis themselves argue that they are really to

produce the rocket bodies for a conventional weapon, a multiple rocket launcher."

But Mr. Powell did not acknowledge that those "other experts" included many of the nation's most authoritative nuclear experts, some of whom said in interviews that they were offended to find themselves now lumped in with a reviled government.

In making the case that the tubes were for centrifuges, Mr. Powell made claims that his own intelligence experts had told him were not accurate. Mr. Powell, for example, asserted to the Security Council that the tubes were manufactured to a tolerance "that far exceeds U.S. requirements for comparable rockets."

Yet in a memo written two days earlier, Mr. Powell's intelligence experts had specifically cautioned him about those very same words. "In fact," they explained, "the most comparable U.S. system is a tactical rocket -- the U.S. Mark 66 air-launched 70-millimeter rocket -- that uses the same, high-grade (7075-T6) aluminum, and that has specifications with similar tolerances."

In the end, Mr. Powell put his personal prestige and reputation behind the C.I.A.'s tube theory.

"When we came to the aluminum tubes," Richard A. Boucher, the State Department spokesman, said in an interview, "the secretary listened to the discussion of the various views among intelligence agencies, and reflected those issues in his presentation. Since his task at the U.N. was to present the views of the United States, he went with the overall judgment of the intelligence community as reflected by the director of central intelligence."

As Mr. Powell summed it up for the United Nations, "People will continue to debate this issue, but there is no doubt in my mind these illicit procurement efforts show that Saddam Hussein is very much focused on putting in place the key missing piece from his nuclear weapons program: the ability to produce fissile material."

Six weeks later, the war began.

Photos: In Colin Powell's speech at the United Nations in early 2003, he showed a slide of tubes he said were part of Iraq's nuclear plans. (Photo by Associated

Press)(pg. 1); ALUMINUM TUBES -- accumulated by Iraq were often stored outside and had to be coated to resist the weather. That coating made them unsuitable for use in centrifuges that could have refined uranium into bomb material. Inspectors at the Nasser metal-working plant in Baghdad were shown in early 2003 how Iraq used the tubes for rockets.; AMERICAN CENTRIFUGES -- in the Oak Ridge plant stand much higher than those used in Europe. (Photographs by the International Atomic Energy Agency); VICE PRESIDENT DICK CHENEY -- "Meet the Press," Sept. 8, 2002 (Photo by Alex Wong/NBC)(pg. 24); CONDOLEEZZA RICE -- CNN, Sept. 8, 2002 (Photo by CNN)(pg. 25); AT THE U.N. IN FEBRUARY 2003, Secretary of State Colin L. Powell described Iraq's tube imports as crucial to its nuclear program. (Photo by James Estrin/The New York Times); SECRETARY COLIN L. POWELL -- United Nations, Feb. 5, 2003 (Photo by Vincent Laforet/The New York Times)(pg. 26)

Chart: "Challenging The C.I.A.'s Case"

Energy Department experts said the Iraqi tubes' design made them poor candidates for use as spinning rotors in nuclear centrifuges. Below, a comparison of the tubes with actual centrifuge rotors shows the experts main arguments.

1. TOO NARROW -- Smaller centrifuges are too inefficient to enrich enough uranium for bombs.

DISPUTED IRAQI TUBES -- Critics said these were far smaller, at 81 millimeter, than any rotors in use for nuclear production. Their diameter was typical only of experimental or prototype centrifuges.

REAL IRAQI CENTRIFUGE ROTOR -- Width used in Iraqi nuclear program, early 1990s.

U.S. PRODUCTION CENTRIFUGE ROTOR -- Width used at Oak Ridge; highly efficient.

2. TOO THICK -- The Iraqi tubes were more than triple the thickness of U.S. and early Iraqi centrifuge rotors, shown here actual size. They would work better if ground

down, which is difficult to do with precision. Manufacturing them to the correct specifications would make much more sense.

3. TOO SHINY -- The Iraqi tubes had a glossy anodized finish unsuitable for centrifuge rotors. Such finishes could react with uranium gas and cause corrosion.

4. TOO LONG -- To work in a centrifuge, the Iraqi tubes would have to be cut down to about one-third their original length. Not making them to centrifuge specifications would have meant needless extra modifications.

SUITED FOR ROCKETS -- The tubes were an exact match for the rocket bodies that the Iraqis were manufacturing at the time. The rockets could be fired from the ground or helicopters .

Diagram of the disputed Iraqi tubes, real Iraqi centrifuge rotor and U.S. centrifuge rotor.

(Sources by David Albright, Institute for Science and International Security; Senate Intelligence Committee; Department of Energy; International Atomic Energy Agency)(pg. 25)