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Yale Probe Of Cancer Eyes Asbestos Ceilings

By DAN HALL

Associated Press Writer
NEW HAVEN (AP) — A research team at Yale University is studying commonly sprayed asbestos ceilings to determine if they cause cancer.

The studies may eventually have widespread impact because of fears among a number of scientists that at least one type of cancer can develop from asbestos exposure far below current federal limits, according to Dr.

Robert N. Sawyer, a physician in Yale University Health Services.

Sprayed-asbestos ceilings came into common use in the mid-1950s and were installed widely in this country until the late 1960s, when dangers of the substance became apparent, he said Thursday in an interview.

The Yale art and architecture building, dedicated in 1963 is one of the numerous buildings which contain the sponge-like ceilings, that slowly shed asbestos. But they can emit clouds of the substance when knocked or disturbed.

That type of ceiling was outlawed by federal authorities in 1971. Common ceiling tiles are not affected by the regulation.

Recent studies by other researchers show a strong relationship between asbestos fibers in the air and cases of mesothelioma, rare cancerous tumors in the lining of the lungs or stomach, Sawyer said.

The tumors, which in nearly all cases have contained asbestos fibers, apparently take two or three decades to

develop, adding to the difficulty of tracing their source, he said.

"Although of low probability, initiation of malignancy is possible with a single, small exposure to asbestos," he reported recently to Yale officials. He said there did not seem to be any danger of asbestos or "white lung" disease, which also are related to asbestos.

As a result of the findings, Yale has placed tight restrictions on activities in the so-called A&A building. The school wants to reduce the amount of minute asbestos particles in the air well below limits set by the Occupational Health and Safety Act (OHSA). Controlled tests showed a person bumping against the low ceiling could inhale more than three times the maximum allowable amount. The building's 52,000 books have been thoroughly cleaned and moved to another building.

Asbestos-exposure levels at all stages of the moving operation are being documented. It is believed to be the first time a large-scale removal of sprayed asbestos will be studied so carefully, Sawyer said.

A team of five persons headed by Peter Tveskov, assistant manager of physical plants, has been working for several months developing the safest removal method.

On Thursday results from experiments using "wet water" with high penetrating power showed that soaking the 3-inch-thick ceilings would be a safe and workable way to proceed.

The university is expected to close the building during the 3½-week Christmas recess while the 70,000 square feet of suspended ceilings in the nine-floor building are removed by workers wearing goggles and breathing masks.

The asbestos and sheet rock supporting it will be sealed in containers to prevent it from escaping into the air. They will be buried in a remote location that has not yet been chosen, Sawyer said.

"Once you go in and disturb that monster in there, he lashes out with his tail," Sawyer said. "Our problem is getting in without awakening him."

The threat posed by the asbestos ceilings was studied in 1971 by state inspectors. But the building was declared safe on the basis of tests on the undisturbed air, Yale researchers said.

A rash of complaints about eye irritation this year among users of the building, particularly in the library, prompted officials to test again.

Some of the eye cases turned out to be conjunctivitis, an irritation of the mucous membrane of the eye.

Protected researchers, using special pumps that simulate a person's breathing, found that a person who bumped against a ceiling, some of which are little higher than seven feet, breathed in a concentration of 18 asbestos fibers per cubic centimeter, according to Yale safety manager Victor Osborne.

The level was less than one fiber per cubic centimeter in undisturbed areas. The current OSHA limit is five fibers. It will soon be reduced to two.

Because of those findings, all ceiling work such as installation of lights has been stopped and dusting is done with chemically treated cloths. Special high-efficiency vacuum cleaners, worth \$700 each, are used for cleaning.

Although initial disclosure of the ceiling danger resulted in widespread "paranoia" among people using the A&A building regularly, it has almost disappeared, Osborne said.

"People in the building have been just fantastic," he said.

Sawyer and the others are collecting information about asbestos exposure in the building under different conditions for future study. The question remains, however, of how little exposure should be considered dangerous.

"I don't believe in the OSHA limits," Sawyer said.

Other studies indicate the exposure

level related to mesothelioma may have a "very low threshold, if any," he said.

"If my suspicions are correct, the effects are going to be monumental," Sawyer added.

While some sprayed-asbestos ceilings in large buildings are high enough not to pose a serious danger, the Yale researchers said some have been already removed as safety precautions.

The University of California at Los Angeles stripped asbestos ceilings from 800 of its dormitory rooms in 1971.

Even if not a danger to occupants, it's a danger to maintenance workers who have to go through it and demolition teams who will eventually take down the buildings," Sawyer said.

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BACONS**SPRAY-ON ASBESTOS****303 Building Material
Said Cancer Risk**By THOMAS HINE
Knight News Wire

NEW HAVEN, Conn.—A material used in the construction of thousands of buildings from 1958 to the early 1970s has been found to be a cancer risk by a team of researchers at Yale University.

As a result, they have ordered that one of the most influential buildings of the 1960s, the Yale Art and Architecture Building be completely stripped of a spray-on material containing asbestos fibers which had been used on the building's ceiling.

This follows an earlier instance at the University of California, where, although conditions were not measured at levels high enough to be classified under federal regulations as hazardous, ceilings were removed from 800 dormitory rooms.

Spray-on materials containing asbestos have not been used in most other major cities since 1971 because research then showed that it presented a severe health hazard during construction, especially to workmen. It had been assumed until now, however, that there was no hazard to persons who worked or lived in the completed building.

Prior to 1971, the material was very popular as insulation, fireproofing and soundproofing. In 1970, for example, it was used in more than half the buildings constructed in the United States.

It had been assumed, however, that there is no hazard to users of the buildings in which the material was used.

At the Yale Art and Architecture Building, Dr. Robert Sawyer found that activities within the building cause an asbestos fall-out, often at very hazardous levels, which could jeopardize students and maintenance employees.

Sawyer says he is not concerned with asbestosis, or "white lung," a disease that frequently afflicts those who work in asbestos plants. Rather, the danger is of mesothelioma, a malignant cancer of the lung and abdominal cavity.

This generally strikes 20 or more years after first exposure to the asbestos, and no "safe" level of exposure to asbestos has yet been determined.

Some activities at the Yale building, such as dusting library books, changing light fixtures and slamming doors were found to have triggered concentrations of asbestos in the air in excess of amounts allowed by new federal regulations that will take effect in January 1976.

The building was one of the most copied buildings of the 1960s. The work of architect Paul Rudolph and completed in 1963, aspects of the forceful reinforced concrete complex have appeared in many buildings since.

It has been widely disliked by its users. In 1969, large parts of it were destroyed by a fire that is generally agreed to have been arson. The ceilings in the portion burnt were replaced with a similar material which does not contain asbestos.

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Yale attacks asbestos problem—Yale University, New Haven, CT, has embarked on an asbestos removal program that could cost as much as or more than \$800,000.

The project is to remove sprayed asbestos from the ceilings of the Art and Architecture Building, using a super wetting agent, called "wet water." (Cost: 250 gallons at \$18-25 per gallon or up to \$5,000.)

Victor Osborne, safety manager, says that disposal costs could reach \$50,000, and that removal costs, including those for labor and temporary lighting, could reach \$750,000.

The program was launched after Osborne, using a personal body monitor, found the levels were well over federal allowances (18 fibers per cc, as compared to federal TLV's of five per cc now and two per cc by January 1976). This indication of danger was compounded by the facts that eye irritation was so chronic and severe that the Art and Architecture Librarian had to be kept from the building, and that maintenance personnel were probably exposed to higher levels than those indicated on the monitor.

Joining Mr. Osborne in Yale University's concern are: Robert N. Sawyer, M.D., Department of Preventive and Occupational Medicine; Peter Tveskov, Associate Manager, Physical Plant; Severio Fodero, Administrative Associate, University Health Services.

Mr. Osborne is not only concerned with removing this hazard, he is in charge of developing the techniques for its safe removal and disposal.

Yale To Remove Dangerous Asbestos In

Rudolph Building

By CAROLYN SUSMAN
Staff Reporter

A wetting agent so powerful that only one pint is used in 300 gallons of water will be tried Tuesday as a means of removing the sprayed asbestos ceilings in the Yale University Art and Architecture building.

The agent, known as "wet water," has already been used in weaker solution (eight ounces to two and one-half gallons regular water) and worked well. The more potent solution is being tried to see if it is more effective.

Yale safety manager Victor Osborne says at least 250 gallons of the less powerful solution would be needed to remove the asbestos at a cost of \$18-\$20 a gallon. Osborne said that disposal of the asbestos, which has been linked to cancer, could cost over \$50,000 and that removal of the substance from the entire building, including costs for temporary lighting and labor, could reach \$750,000.

The extensive revamping of the building has been ordered since the discovery of very high levels of asbestos particles during normal cleaning activities at the building.

Osborne has been involved with problems at the structure for over three years since complaints about the crumbling ceilings at the building were being filed regularly back in 1971.

Tests conducted then found asbestos levels weren't hazardous, but only the air was being measured. Tests later conducted by Osborne, wearing a personal body monitor to measure exposure directly on individuals, found levels well over federal allowances.

In the Art and Architecture library, a prime target of the

asbestos-removal program, Osborne's monitor registered over 18 fibers per cubic centimeter of air. The current federal limit (considered too high by experts) is five fibers per cubic centimeter and that will be reduced to two fibers in January, 1976.

"We put it (a monitor) onto a librarian and he got almost one fiber per cubic centimeter just doing normal (non-cleaning) work. The problem for maintenance people is they get a heck of a lot more (exposure) than the average person," Osborne explained.

About two months ago, the building was closed from 2 to 7 a.m., the hours maintenance and custodial work might be done. Osborne monitored the operations and made sure any workers were fully protected from the falling and crumbling ceilings by special clothing.

"It's not hazardous to occupy the building," Osborne stressed. The basic problem is the low ceilings began flaking, particularly in the library, when books were grabbed off the top shelves, when light fixtures were changed, or when custodians dusted.

Osborne said the ceilings were sealed with latex paint at one point and that "worked out fine" until concern began to grow about the asbestos menace. That was compounded by complaints of eye irritations by people who worked in the building.

Asbestos contains unusual chemical and physical properties and is considered one of the prime industrial causes of cancer in the world.

About 70 per cent of the ceiling area of the building, estimated at 70,000 square feet, is covered with the sprayed asbestos compound.

Robert Kaufmann, art and architecture librarian, has been kept out of the building because of chronic eye irritations

strongly linked with the flaking asbestos. Noted scientists and doctors claim that there isn't any safe level yet known of exposure to the substance.

Malignancies linked to asbestos may take 20 years to develop and continued exposure isn't required. Renowned asbestos researcher Dr. Irving Selikoff of Mt. Sinai School of Medicine in New York says all unnecessary exposure should be avoided.

In fact, Selikoff told a Stratford audience last week of a case where a worker had only six weeks exposure to the asbestos, but developed cancer of the lung because "that dust was exposing his lungs for 20 years."

Efforts to remove the ceilings at the art and architecture building will probably be the first of such a large scale where the substance will be removed without contaminating anyone. Removal techniques are being developed by Osborne.

The asbestos will be sprayed with the wet water and taken off as it becomes "gushy", Osborne said. It will be placed in 55-gallon drums and taken to a site in

New York city which is licensed to handle and dispose of the materials.

Asbestos fallout

Building faces \$200,000 job
of removing asbestos ceilings

Almost 40,000 sq ft of sheetrock ceiling panels sprayed with asbestos must be removed from a multi-use building because of the health threat posed by falling asbestos particles and asbestos dust circulating in the ventilation system.

More than 52,000 books must first be removed before the panels can be taken out of the first floor library of Yale University's art and architecture building in New Haven, Conn. The job of cleaning and moving the books to a safer building and dismantling the ceiling panels in the library and the building's auditorium, studio and exhibit areas will cost at least \$200,000.

It has not been decided whether to install a new acoustical ceiling or to leave exposed the prestressed concrete floors. A new library ventilation system, probably using air ducts, will have to be installed to replace the 10-in. plenum system now above the sheetrock panels that are mounted on furring channels. Incandescent lighting equipment built into the ceiling will also have to be replaced.

The asbestos flaking was first noticed several years ago. A commercial sealant was applied to the ceilings this year but is apparently ineffective. The Asbestos Information Association, a New York City-based organization of eight asbestos products manufacturers, recommends sealing asbestos-sprayed ceiling panels to prevent flaking and the resultant asbestos dust.

The falling asbestos particles have been linked to chronic eye irritations in at least three library users, and the custodial staff is now wearing protective face masks. Flaking of spray-applied asbestos and the resultant dust that circulates in air-ventilation systems may pose a cancer threat, according to the National Institute for Occupational Safety and Health.

The ribbed concrete building was designed by architect Paul Rudolph, New Haven, in a pinwheel plan of overlapping and interpenetrating platforms. The building has seven stories and 36 different levels with ceiling heights from 7.5 ft in the library to 28 ft in other areas.

The same problem of flaking of spray-applied asbestos was experienced this year at the University of California at Los Angeles. Asbestos finish had to be scraped from ceilings in 800 rooms in two dormitories at a cost of \$250,000.

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303 *Optimum sulfate content of portland cements (a standard stepwise multiple regression algorithm was used to calculate the optimum sulfate content. While the equations developed are not generally applicable to all plants and all mix designs, the approach is valuable in plant control) (11a).Falling asbestos particles and asbestos dust from asbestos-sprayed ceiling panels are circulating in the ventilation system of a Yale U bldg, reportedly posing a health hazard. Close to 40,000 sq-ft of the ceiling must be removed. The flaking became apparent several yr ago. A commercial sealant applied to the panels this yr proved ineffective (12a).

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Clean Sweep: Getting Asbestos Out of the A&A

For the second time in five years the students and facilities at the building will be scattered to different parts of the campus. A fire in June, 1969, burned out three floors of the nine-floor, 36-level building, closing it for a year of repair. Now most of the building will be closed again, in successive stages, while workers wearing goggles and respirators remove 70,000 square feet of asbestos ceiling material.

Asbestos is now known to be a cause of cancer and for some time has been known to cause a scarring of the lungs called asbestosis, which in its extreme form is the "white lung" experienced by asbestos factory workers. A continuing study—using pioneering methods which should be widely applicable elsewhere—by Dr. Robert N. Sawyer, a physician in the University Health Services, has shown that workers and perhaps occasional users of the building are exposed to amounts of asbestos exceeding federal Occupational Safety and Health Act (OSHA) limits.

Removal of the asbestos—a fire and sound retardant which was sprayed into place in the late stages of the building's construction—will cost a minimum \$250,000 and might reach \$750,000, according to John F. Embersits, director of University Operations.

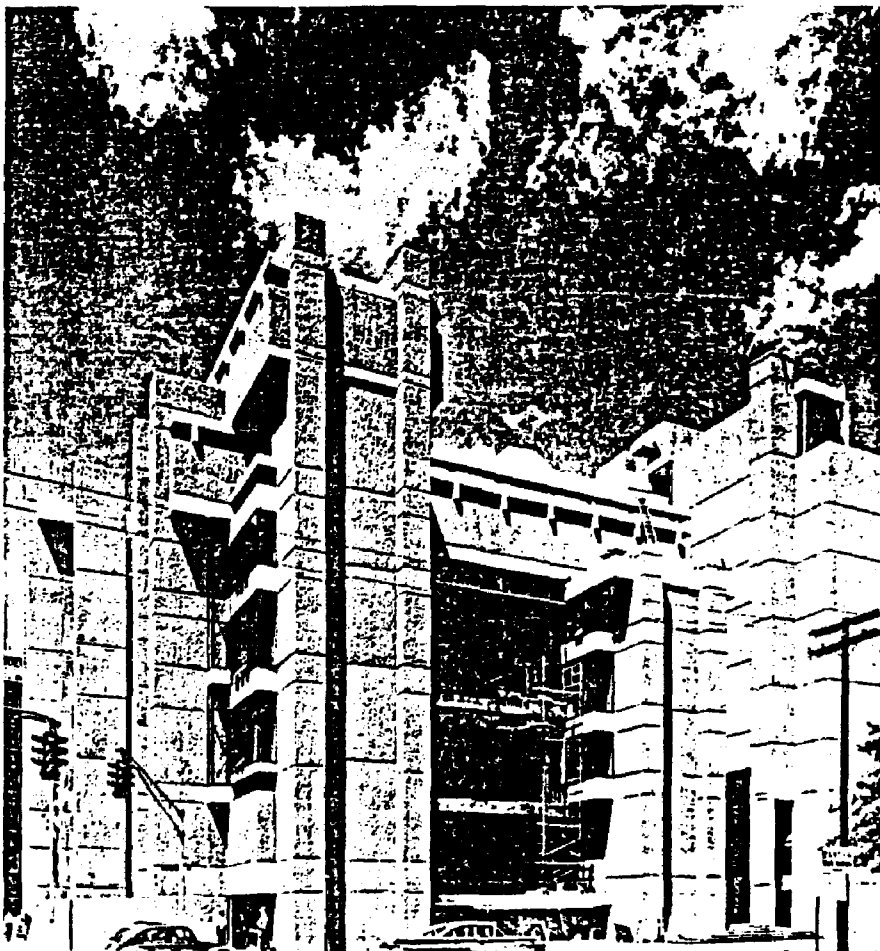
Thus still another chapter has begun in the building's history of costliness and controversy. Its dedication on Nov. 9,

1963, was featured as a cover story and hailed as a major event by most American architectural magazines. Under A. Whitney Griswold, president of Yale, who had urged the University to "trust the creative spirit and impulse of the greatest architects of our generation," Yale had become a showpiece of modern architecture. Its jewels included Louis Kahn's Art Gallery, Eero Saarinen's Ingalls Rink, and Gordon Bunshaft's Beinecke Rare Book Library.

The Art & Architecture Building, completed soon after Griswold's death, was the last building he had commis-

sioned. Paul Rudolph, one of the country's most original architects and then chairman of Yale's Department of Architecture, had created the \$3 million building, it was said, to serve as a challenge and inspiration to students of architecture and as a unifying structure for all art students at Yale.

Almost immediately it became clear that the building was more challenge than inspiration. The floor-to-ceiling windows didn't open, and some had to be washed by men in bosun's chairs lowered from the roof—bringing the cost of a win-



dow-washing to about \$2,000, according to Mr. Embersits. There was no large service elevator linking the building's many levels, and moving large or heavy objects was further impeded by constricted stairways. And a print-making instructor, who had told Rudolph that his students needed an open and well-lit space, found himself consigned to "a bloody dungeon" in the basement.

Numerous improvements in lighting and alteration of interior spaces have been demanded in the building—which since 1963 has cost the University about \$500,000 for changes and extraordinary maintenance, such as window washing, according to Mr. Embersits.

In view of all the complaints over the years, Dr. Sawyer was not surprised that he received what he called "cease and desist" orders when he first went to the administration in February to report his suspicion that aspects of the building—particularly the asbestos—might be endangering workers there.

"I was told," he said, "not to waste my time over there"—that a study had been done by the State in 1971 and had shown negligible results. That study had used asbestos fiber counters placed in a room overnight to monitor fallout from

the ceiling. "I had no axe to grind," Dr. Sawyer says. "I didn't go in looking for trouble. The trouble was coming to us here at the Health Service. We were getting a lot of complaints."

One complaint came from a librarian in the art library, who had chronic conjunctivitis—an irritation of the mucous membrane of the eye—and who told Sawyer of two similar cases on the staff. Dr. Sawyer also learned that the director of the library, Robert Kaufmann, was suffering from an eye injury he had received away from work but which was failing to heal. Yale physicians examined his eye and found what they thought might be asbestos fibers.

But Dr. Sawyer's main contributions were to realize—a discovery apparently made for the first time—and to document that a maintenance worker bolting a light fixture into the ceiling, or a librarian handling asbestos-coated books, would inhale more fibers than the state's fiber monitor did while sitting in a quiet room.

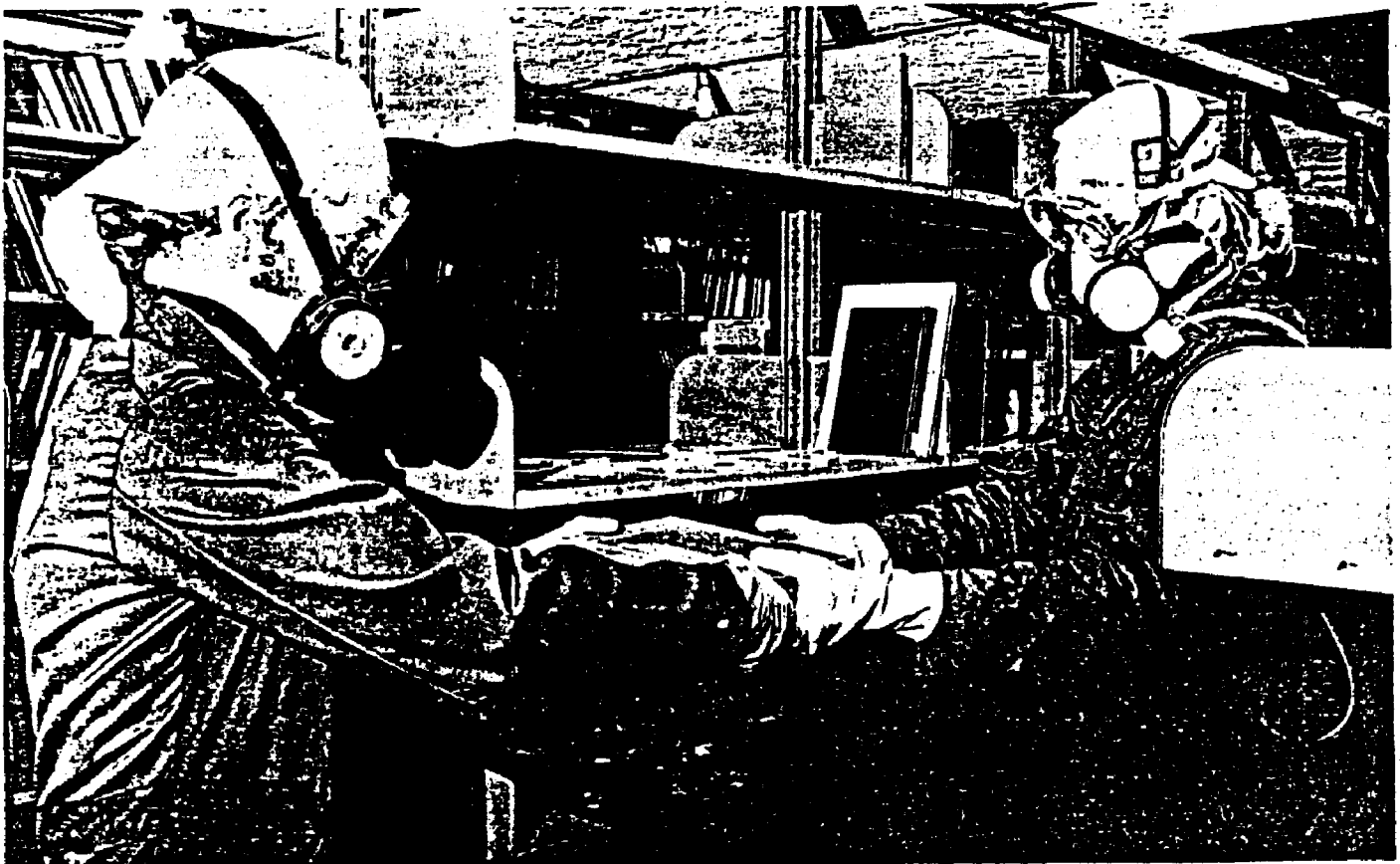
Under his direction, people equipped with protective respirators and "personnel monitors"—filtered pumps which simulate normal breathing rates—performed dusting and cleaning chores and recorded asbestos fiber counts well in excess of the OSHA limits. When Dr.

Sawyer presented these data to Yale administrators, their reaction was "Wow! Of course!" and he was on his way to his present status as Yale's asbestos czar. Now he is called on to oversee even routine maintenance, like changing light bulbs.

While Dr. Sawyer is apparently the first to correctly analyze and document the extent to which different activities in a building affect the amount of asbestos that a person inhales, Yale is not the first and certainly not the last institution faced with the problem and a need to monitor it. Sprayed-on ceilings have been used in thousands of buildings, and Dr. Sawyer speculates that the degree of danger varies considerably according to such factors as ceiling height and changes in humidity level.

The University of California at Los Angeles, for instance, faced a similar problem with asbestos ceilings in 800 dormitory rooms. Quiet room monitoring showed an asbestos level similar to that found during the 1971 monitoring at Yale. Nevertheless the asbestos was removed. The university did not attempt to document the asbestos level during activities such as cleaning.

"We're developing knowledge and expertise in an area that I believe is going



Workers in art and architecture library stacks (photo above) remove books from asbestos-dust-covered shelves, prior to vacuum cleaning (right).

to have tremendous importance," Dr. Sawyer says. "We've outstripped many so-called experts already in what we've done—our study has shown a quantum leap in understanding from the 1971 study." He expects that the greatest value of the work done at the Art & Architecture Building will be in reports on Yale's new monitoring and removal techniques, which will be published and made available all over the country. "I'd hate to be putting so much time into this if it were only a brush fire," he says.

On Aug. 20 Dr. Sawyer submitted a 16-page interim report documenting possible health hazards in addition to asbestos in the building—undrinkable water, bird cadavers in the ventilation system, low railings and low ceilings.

"Considering the height and accessibility of unprotected hard objects, light fixtures, open electrical sockets, railings, ledges and open louvers," he wrote, "it is our serious opinion that physical danger exists for adults taller than 6'2" and children below the age of 10." The report urged corrective measures, including the removal of asbestos from the entire building. Most of the recommendations have been accepted and work begun. The asbestos problems, however, cause the most difficulty and anxiety—particularly because, Dr. Sawyer says, the levels at which it is dangerous are still being defined.

One study, for example, by a physician at Mt. Sinai Hospital in New York, published in September, reported a high incidence of apparently asbestos-related lung scarring and cancerous tumors known as mesotheliomas in the families of workers who many years ago had been employed in a New Jersey asbestos factory. It suggested that even very moderate and short-term exposure can, after a waiting period of 10 to perhaps 40 years, result in serious illness.

That study has prompted labor leaders to call for a reduction to virtually zero in the OSHA-allowed maximum limit. It is now defined as five fibers per cubic centimeter of air and will be reduced to two fibers per cubic centimeter in 1976. Dr. Sawyer's study found that light dusting stirred up a count of 5.3 fibers, while a worker who hit the ceiling while cleaning was exposed—for a short time—to a count of 18.3 fibers.

Work is now well under way (see photos) on the year-long project of scouring the building. The first element to go is the 52,000-volume library, which will be vacuum-cleaned, book-by-book,

and removed to the Cross Campus Library. The equipment includes two \$700 vacuum cleaners with absolute filters of a type developed for gathering moon dust from space capsules. Workers are wearing respirators for vacuuming, and when they begin to pull down ceiling panels Dr. Sawyer says they will use masks hooked to an air compressor.

Dr. Sawyer has been relieved of all other health service responsibilities and to be on hand at all hours for cleaning has had a bed in the building's guest suite made up for him. He has taken over Paul Rudolph's old office—where there is no asbestos—for his equipment.

The new frustration over the building has again focused attention, perhaps unfairly, on its architect. The charge has been frequently repeated that, as one high Yale administrator put it, "the problem with the A & A is that Rudolph was his own client."

Mr. Rudolph, who says he has "become very emotional about that particular building," disagrees. "I certainly didn't think I had a free hand," he recalled in an interview last week. "There were building committees and buildings-and-grounds people. It seemed to me at the time that there were enough peo-

ple looking over my shoulder at Yale.

"And I certainly had no idea at the time that there was a health problem involving asbestos. Maybe other people did, but I don't really think so. I certainly don't think if anybody had ever said, 'You know this is a potential health hazard,' I would ever have put it in. Even I."

Alvin Eisenman, a member of the building committee for the A & A, believes that one reason why the ceilings were never questioned is that the committee was never told about them, but he adds that "this business of blaming Rudolph has gone too far. The main problem with the building probably was that there wasn't anyone really strong on the building committee."

Because of the extreme frustration and anxiety, there has even been talk around the University of possible legal action.

While the work of many people has once again been disrupted at the Art & Architecture Building, for others it is a question of degree. "Some students come into the library with handkerchiefs tied over nose and mouth," one librarian said, "while some come in to study and smoke three packs of cigarettes in a night and don't seem to worry about asbestos."

