МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
ОДЕСЬКИЙ ДЕРЖАВНИЙ ЕКОЛОГІЧНИЙ УНІВЕРСИТЕТ

Методичні вказівки
до виконання контрольної роботи
З АНГЛІЙСЬКОЇ МОВИ
для студентів III курсу
заочної форми навчання
Напрям підготовки – екологія

"Затверджено"
на засіданні робочої групи методичної
ради "Заочна та післядипломна освіта"

ОДЕСА – 2004

Методичні вказівки до виконання контрольної роботи з англійської мови для студентів III курсу заочної форми навчання.
Напрям підготовки – екологія

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Передмова

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Метою запропонованих методичних вказівок для самостійної роботи студентів (СРС) та навчального матеріалу з англійської мови для студентів ІІІ курсу заочної форми навчання, напрям підготовки – "екологія" є:

– виробити у студентів навички читання та перекладу науково-технічної літератури англійською мовою за фахом "екологія";

– розвинути вміння розуміти зміст прочитаного;

– виробити навики постановки запитань до тексту англійською мовою;

– підготовити студентів до складання іспиту з англійської мови.

Навчальна програма для студентів ІІІ курсу заочної форми навчання розрахована на 144 годин СРС та на 22 години аудиторної роботи.

КОНТРОЛЬНА РОБОТА №8

ВАРІАНТ №1

I. Translate this text in writing :

Text

For centuries, chemical wastes have been the by-products of developing societies. Disposal sites were selected for convenience and placed with little or no attention to potential impacts on groundwater quality, runoff to streams and lakes, and skin contact as children played hide-and-seek in a forest of abandoned 55-gallon drums. Engineering decisions here historically were made by default; lack of planning for handling or processing or disposal at the corporate or plant level necessitated “quick and dirty” decision by mid- and entry-level engineers at the end of production processes. These production engineers solved disposal problems by simply piling or dumping these waste products “out back”.

Attitudes began to change in the 1960s, 1970s, and 1980s. As other chapters of this text indicate, air, water, and land were no longer viewed as commodities to be polluted with the problems of cleanup freely passed to neighboring towns or future generations. Individuals responded with court actions against polluters, and governments responded with revised local zoning ordinances, updated public health laws, and new major Federal Clean Air and Clean Water Acts. In 1976, the Federal Resource Conservation and Recovery Act (RCRA) was enacted to give the U.S. Environmental Protection Agency (EPA) specific authority to regulate the generation, transportation, and disposal of dangerous and hazardous materials. In the 1990s we find that engineering knowledge and expertise has not kept pace with this awakening to the necessity to manage hazardous wastes adequately. This chapter discusses the state of knowledge in the field of hazardous waste engineering, tracing the quantities of wastes generated in the nation from handling and processing options through transportation controls, to resource recovery, and ultimate disposal alternatives.

MAGNITUDE OF THE PROBLEM

Over the years, the term “hazardous” has evolved in a confusing setting as different groups advocate many criteria for classifying a waste as “hazardous”. Within the federal government, different agencies use such descriptions as toxic, explosive, and radioactive to label a waste as hazardous. Different states have other classification systems, as did the National Academy of Sciences and the National Cancer Institute.

The federal government attempted to impose a nationwide classification system under the implementation of RCRA, in which a hazardous waste is defined by the degree of instability, corrosively, reactivity, or toxicity. This definition includes acids, toxic chemicals, explosives, and other harmful or potentially harmful or potentially harmful waste. In this chapter, this is the applicable definition of hazardous waste. Radioactive wastes are excluded. Such wastes obviously are hazardous, but because their generation, handling, processing, and disposal differ so drastically from those of non-nuclear hazards, the radioactive waste problem is addressed separately.

Given this somewhat limited definition, more than 60 million metric tons, by wet weight, of hazardous waste are generated annually throughout the United States. More than 60% is generated by the chemical and allied products industry. The machinery, primary metals, paper and glass products industries each generate between 3 and 10% of the nation's total. Approximately 60% of the hazardous waste is liquid or sludge. Major generating states, including New Jersey, Illinois, Ohio, California, Pennsylvania, Texas, new York, Michigan, Tennessee and Indiana contribute more than 80% of the nation's total production of hazardous waste, and the waste's majority is disposed of on the generator's property.

A hasty reading of these hazardous waste facts points to several interesting, though shocking, conclusions. Most hazardous waste is generated and inadequately disposed of in the eastern portion of the country. In this region, the climate is wet with patterns of rainfall that permit infiltration or runoff to occur. Infiltration permits the transport of hazardous waste into groundwater supplies, and surface runoff leads to the contamination of streams and lakes. Moreover, most hazardous waste is generated and disposed of in areas where people rely on aquifers for drinking water.

Major aquifers and well withdrawals underlie areas where the wastes are generated. Thus, the hazardous waste problem is compounded by two considerations: the wastes are generated and disposed of in areas it rains and in areas where people rely on aquifers for supplies of drinking water.

WASTE PROCESSING AND HANDLING

Waste processing and handling are key concerns as a hazardous waste begins its journey from the generator site to a secure long-term storage facility. Ideally, the waste can be stabilized, detoxified, or somehow rendered harmless in a treatment process similar to the following:

Chemical Stabilization / Fixation. In these process, chemicals are mixed with waste sludge, the mixture is pumped onto land, and solidification occurs in several days or weeks. The result is a chemical nest that entraps the waste, and pollutants such as heavy metals may be chemically bound in insoluble complexes. Asphalt-like compounds from "cages" around the waste molecules, while grout and cement from actual chemical bonds with the trapped substances. Chemical stabilization offers an alternative to digging up and moving large quantities of hazardous waste, and is particularly suitable for treating large volumes of dilute waste. Proponents of these processes have argued for building roadways, dams, and bridges with a selected cement as the fixing agent. The adequacy of the containment offered by these processes has not been documented, however, as long-term leaching and defixation potentials are not well understood.

Volume Reduction. Volume reduction is usually achieved by incineration, that takes advantage of the large organic fraction of waste being generated by many industries, but may lead to secondary problems for hazardous waste engineers: air emissions in the stack of the incinerator and ash production in the base of the incinerator. Both by-products of incineration must be addressed in terms of risk, as well as legal and economic constraints (as must all hazardous waste treatment, for that matter). Because incineration is often considered a very good method for the ultimate disposal of hazardous waste, we discuss it in some detail later in this chapter.

Waste Segregation. Before shipment to a processing or long-term storage facility, wastes are segregated by type and chemical characteristics. Similar wastes are grouped in a 55-gallon drum or group of drums, segregating liquids such as acids from solids as contaminated laboratory clothing and equipment. Waste segregation is generally practiced to prevent undesirable reactions at disposal sites and may lead to economics of scale in the design of detoxification or resource recovery facilities.

Detoxification. Many thermal, chemical, and biological processes are available to detoxify chemical wastes. Options include:

- Neutralization
- Ion exchange
- Incineration
- Pyrolysis
- Aerated lagoons
- Waste stabilization ponds.

These techniques are specific; ion exchange obviously does not work for every chemical, and some forms of heat treatment may be prohibitively expensive for sludge that has a high water content.

Degradation. Methods exist that chemically degrade some hazardous wastes and render them less hazardous. Chemical degradation is a form of chemical detoxification. Waste specific degradation processes include hydrolysis, which destroys organophosphorus and carbonate pesticides, and chemical dechlorination, which destroys some polychlorinated pesticides. Biological degradation generally involves incorporating the waste into the soil. Landfarming, as it has been termed, relies on healthy soil microorganisms to metabolize the waste components. Landfarming sites must be strictly controlled for possible water and air pollution that results from overactive or underactive organism pollutions.

Encapsulation. A wide range of material is available to encapsulate hazardous waste. Options include the basic 55-gallon steel drum (the primary container for liquids), clay, plastics, and asphalt: these materials may also be implemented to solidify the waste. Several layers of different materials are often recommended for the outside of the drum, such as an inch or more of polyurethane foam to prevent corrosion.

II. Put 5 questions to the text.
Example: ***When did attitudes to the problem of hazardous waste begin to change ?***

КОНТРОЛЬНА РОБОТА №8

ВАРІАНТ №2

I. Translate this text in writing :

Text SOURCES OF WATER POLLUTION

Water pollutants are categorized as *point source* or *nonpoint source*, the former being identified as all dry weather pollutants that enter water courses through pipes or channels. Storm drainage, even though the water may enter watercourses by way of pipes or channels, is considered nonpoint source pollution. Other nonpoint source pollution comes from farm runoff, construction sites, and other land disturbances.

Point source pollution comes mainly from industrial facilities and municipal wastewater treatment plants. The range of pollutants is vast, depending only on what gets "thrown down the drain".

Oxygen demanding substances such as might be discharged from milk processing plants, breweries, or paper mills, as well as municipal waste water treatment plants, comprise one of the most important types of pollutants because these materials decompose in the watercourse and can deplete the water of oxygen and create anaerobic conditions. *Suspended solids* also contribute to oxygen depletion; in addition, they create unsightly conditions and can cause unpleasant odors. *Nutrients*, mainly nitrogen and phosphorus, can promote accelerated eutrophication, and some *bioconcentrated metals* can adversely affect aquatic ecosystems as well as making the water unusable for human contact or consumption.

Heat is also an industrial waste that is discharged into water; heated discharges may drastically alter the ecology of a stream or lake. Although such local heating can have beneficial effects like freeing harbors from ice, the primary effect is deleterious: lowering the solubility of oxygen in the water, because gas solubility in water is inversely proportional to temperature, and thereby reducing the amount of dissolved oxygen (DO) available to gillbreathing species. As the level of DO decreases, metabolic activity of aerobic aquatic species increases, thus increasing oxygen demand.

Municipal waste is as important a source of water pollution as industrial waste. A century ago, most discharges from municipalities received no treatment whatsoever. Since that time, the population and the pollution contributed by municipal discharge have both increased, but treatment has increased also. We define a *population equivalent* of municipal discharge as equivalent of the amount of untreated discharge contributed by a given number of people. For example, if a community of 20,000 people has 50% effective sewage treatment, the population equivalent is

$$(0,5)\ (20,000) = 10,000$$

Similarly, if each individual contributes 0,2 lb of solids per day into wastewater, and an industry discharges 1,000 lb/day, the industry has a population equivalent of 1,000/0,2 or 5,000.

The current estimate of the population equivalent of municipal discharges into U.S. surface water is about 100 million, for a population of nearly 300 million. The contribution of municipal discharges to water pollution has not decreased significantly in the past several decades, nor has it significantly increased; at least we are not falling behind.

The sewerage systems in older U.S. cities have aggravated the wastewater discharge situation. When these cities were first built, engineers realized that sewers were necessary to carry off both storm water and sanitary wastes, and they usually designed a single system to carry both discharges to the nearest appropriate body of water. Such systems are known as *combined sewers*. As years passed, city populations increased, and the need for sewage treatment became apparent, *separate sewerage* systems were built: one system to carry sanitary sewage to the treatment facility and the other to carry off storm runoff water.

Almost all of the cities with combined sewers have built treatment plants that can treat *dry weather flow*: the sanitary wastes when there is no stormwater runoff. As long as it does not rain, the plants can handle the flow and provide sufficient treatment. Rain, however, increases the flow to many times the dry weather flow and most of it must be bypassed directly into a river, lake, or bay. The overflow will contain sewage as well as storm water, and can be a significant pollutant to the receiving water. Attempts to capture and store the excess flow for subsequent treatment are expensive, but the cost of separating combined sewer sewerage is prohibitive.

Agricultural wastes, should they flow directly into surface waters, have a collective population equivalent of about two billion. Feedlots where large numbers of animals are penned into relatively small spaces provide an efficient way to raise animals for food. They are usually located near slaughterhouses, and thus near cities. Feedlot drainage (and drainage from intensive poultry cultivation) creates an extremely high potential for water pollution. Aquaculture has a similar problem because wastes are concentrated in a relatively small space.

Sediment from land erosion may also be classified as a pollutant. Sediment consists of mostly inorganic material washed into a stream as a result of land cultivation, construction, demolition, and mining operations. Sediment interferes with fish spawning because it can cover beds and block light penetration, making food harder to find. Sediment can also damage gill structures directly.

Pollution from petroleum compounds ("*oil pollution*") first came to public attention with the *Torrey Canyon* disaster in 1967. The huge tanker loaded with crude oil plowed into a reef in the English Channel, despite maps showing the submerged reefs. Almost all of the oil leaked out, despite British and French attempts to burn it, and fouled French and English beaches. Eventually, both straw to soak up the oil, and detergents to disperse it helped remove the oil from the beaches, but the detergents were found to the cleanup method more harmful to the coastal ecology.

By far the most notorious recent incident has been the Exxon Valdez spill in Prince William Sound in Alaska. Oil in Alaska is produced in the Prudhoe Bay region in northern Alaska and piped down to the tanker terminal in Valdez on the southern coast. On 24 March 1989, the Exxon Valdez, a huge oil tanker loaded with crude oil, veered off course and hit a submerged reef, spilling about 11 million gallons of oil into Prince William Sound. The effect was devastating on the fragile ecology. About 40,000 birds died, including about 150 bald eagles. The final toll on wildlife will never be known, but the effect of the spill on the local fishing economy can be calculated and it exceeds $100 million. The cleanup by Exxon cost at least $2 bullion, and the legal responsibility is still being debated.

Although oil spills as large as the Exxon Valdez spill get a lot of publicity, it is estimated that there are about 10,000 serious oil spills in the United States every year, and many more minor spills from routine operations that do not make headlines. The effect of some of the spills may never be known.

The acute effect of oil on birds, fish, and microorganisms is quite well catalogued. The subtle effects of oil on other aquatic life is not so well understood and is potentially more harmful. For example, anadromous fish, such as salmon, that find their home stream by the smell or taste of the water can become so confused by the presence of strange hydrocarbons that they will refuse to enter their spawning streams.

Acid mine drainage has polluted surface since the beginning of ore mining. Sulfur-laden water leached from mines, including old and abandoned mines as well as active ones, contains sulfur compounds that oxidize to sulfuric acid on contact with air. The resulting acidity of the stream or lake into which this water drains is often high enough to kill the aquatic ecosystem.

The effects of water pollution can be best understood in the context of an aquatic ecosystem, by studying one or more specific interactions of pollutants with that ecosystem.

II. Put 5 questions to the text.
Example: ***Why is heat also considered an industrial waste ?***

КОНТРОЛЬНА РОБОТА №8

ВАРІАНТ №3

I. Translate these texts in writing :

<u>Text A</u> WATER POLLUTION LAW. DRINKING WATER STANDARTS

Drinking water standards are equally if not more important to public health than stream standards. These standards have a long history. In 1914, faced with the questionable quality of potable water in the towns along their routes, the railroad industry asked the U.S. Public Health Service (USPHS) to suggest standards that characterize drinking water. As a result, the first USPHS Drinking Water Standards were born. There was no law passed to require that all towns abide by these standards, but it was established that interstate transportation would not be allowed to stop at towns that could not provide water of adequate quality. Over the years most water supplies in the United States have not been closely regulated, and the high-quality water provided by municipal systems has been as much the result of the professional pride of the water industry personnel as any governmental restrictions.

Because of a growing concern with the quality of some of the urban water supplies and reports that not all waters are as pure and safe as people have always assumed, the federal government passed the Safe Drinking Water Act in 1974. This law authorized the EPA to set minimum national drinking water standards.

Physical standards include: color, turbidity, and odor, all of which are not dangerous in themselves but could, if present in excessive amounts, drive people to drink other, perhaps less safe, water.

Bacteriological standards are in terms of coliform bacteria, the indicators of pollution by wastes from warm-blooded animals. The present EPA standard calls for a concentration of coliform of less than 1/100 mL of water. This standard is a classical example of how the principle of expediency is used to set standards. Before modern water treatment plants were commonplace, the bacteriological standard stood at 10 coliform/100 mL. In 1946, this was changed to the present level of 1/100 mL. In reality, with modern methods we can attain about 0.01 coliform/100 mL, and this will doubtless be a future standard.

Chemical standards include a long list of chemical contaminants beginning with arsenic and ending with zinc. Two classifications exist, the first being a suggested limit, the latter a maximum allowable limit. Arsenic, for example, has a suggested limit of 0,01 mg/L. This concentration has, from experience, been shown to be a safe level even when ingested over an extended period. The maximum allowable arsenic level is 0.05 mg/L, which is still under the toxic threshold but close enough to create public health concern. On the other hand, some chemicals such as chlorides have no maximum allowable limits since at concentrations above the suggested limits the water becomes unfit to drink on the basis of taste or odor.

At present, the only legislation that directly protects groundwater quality is the Safe Drinking Water Act. Increasing pollution of groundwater from landfill leachate and inadequately stabilized waste sites is a matter for public concern. Products of the anaerobic degradation of plastics and other synthetic materials are found in groundwater in increasing concentration. Some provisions of the Resource Conservation and Recovery Act (RCRA), particularly the provision prohibiting landfill disposal of organic liquids and pyrophoric substances, also provide groundwater protection.

Conclusion. Over the years, the battles for clean water have moved from the courtroom, through the congressional chambers, to the administrative offices of the EPA and state departments of natural resources. The strengths and weaknesses of the Water Pollution Law are not unique to the United States. Throughout central and eastern Europe, for example, massive problems exist because (1) pollution from agricultural runoff, including soil, nitrates, pesticides, and industrial contamination by toxic organic compounds and metals; and (2) discharge of interested or poorly treated water sites having high levels of BOD, nutrients, and suspended solids. In Czechoslovakia, 2.500 municipalities serving 2.5 million people do not have public wastewater treatment facilities. Government worldwide are both successful and unsuccessful at different legal and economic systems and address similar problems differently.

In the United States, permitting systems have replaced inconsistent, one-case-at-a-time judicial proceedings as ambient water quality standards and effluent standards are sought. Tough decisions lie ahead as current water programs are administered, particularly the NPDES permits for polluters discharging to waterways and the pretreatment guidelines for polluters discharging to municipal sewer systems. Even tougher decisions must be faced in the future as regulations are developed for the control of toxic substances.

Text B SLUDGE TREATMENT AND DISPOSAL. ULTIMATE DISPOSAL

The options for ultimate disposal of sludge are limited to air, water, and land. Strict controls on air pollution complicate incineration, although this certainly is an option. Disposal of sludges in deep water (such as oceans) is decreasing owing to adverse or unknown detrimental effects on aquatic ecology. Land disposal may be either dumping in a landfill or spreading the sludge out over land and allowing natural biodegradation to assimilate the sludge into the soil. Because of environmental and cost considerations, incineration and land disposal are presently most widely used. These is increasing interest in the use of sludge as a fertilizer.

Incineration is actually not a method of disposal at all, but rather a sludge treatment step in which the organics are converted to H_2O and CO_2, and the inorganics drop out as a non-putroscent residue. Two types of incinerators have found use in sludge treatment: multiple hearth and fluid bed. The multiple hearth incinerator, as the name implies, has several hearths stacked vertically, with rabble arms pushing the sludge progressively downward through the hottest layers and finally into the ash pit. The fluidized bed incinerator is full of hot sand and is suspended by air injection, and the sludge is incinerated within the moving sand. Owing to the violent motion within the fluid bed, scraper arms are unnecessary. The sand acts as a “thermal flywheel”, allowing intermittent operation.

The second method of disposal – land spreading – is becoming more popular, as sludges become less contaminated with heavy metals. The ability of land to absorb sludge and to assimilate it depends on such variables as soil type, vegetation, rainfall, slope, etc. In addition, the important variable of the sludge itself will influence the capacity of a soil to assimilate sludge.

Generally, sandy soils with lush vegetation, low rainfall, and gentle slopes have proven most successful. Mixed digested sludges have been spread from tank trucks, and activated sludges have been sprayed from both fixed and moving nozzles. The application rate has been variable, but 100 dry tons/acre-yr is not an unreasonable estimate. Most unsuccessful land application systems may be traced to overloading the soil. Given enough time (and absence of toxic materials) and soil will assimilate sprayed liquid sludge.

There has been some successful use of land application for sludge as fertilization, particularly in silviculture operations. Forests and tree nurseries are far enough from population centers to minimize aesthetic objections, and the variable nature of sludge is not so problematical in silviculture as in other agricultural applications. Sludge may also be treated as packaged fertilizer and plant food. The city of Milwaukee has pioneered the drying, disinfection, and deodorizing of sludge, which is packaged and marketed as the fertilizer Milorganite.

Transporting liquid sludge is often expensive, and volume reduction by dewatering is necessary. The solid sludge may then be deposited on land and disked in. A higher rate (tons/acre-yr) may by achieved by trenching where 1-m^2 (3-ft^2) trenches are dug with a backhoe, and the sludge is deposited and covered. The sludge seems to assimilate rapidly, with undue leaching of nitrates or toxins.

In the last few years a method of chemically bonding the sludge solids so that the mixture "sets" in a few days has found use in industries that have especially critical sludge problems. Although *chemical fixation* is expensive, it is often the only alternative for besieged industrial plants. The leaching from the solid seems to be minimal.

Sludge toxicity may be interpreted in several ways: toxicity to vegetation, toxicity to animals (including people) who eat the vegetation, and poisoning of groundwater supplies. Most domestic sludges do not contain sufficient toxins such as heavy metals to cause harm to vegetation. The total body burden of heavy metals is of some concern, however. It is possible to precipitate out the metals during sludge treatment, but the most effective means of controlling such toxicity seems to be to prevent metals from entering the sewerage system. Strong enforced sewerage ordinances are necessary and may be cost-effective.

II. Put 5 questions to the texts.

Example: ***Why is disposal of sludges in deep water (such as ocean) dicreasing ?***

КОНТРОЛЬНА РОБОТА №9

ВАРІАНТ №1

I. Translate this text in writing :

<u>Text</u> RISK ANALYSIS

One of the jobs of the environmental engineer is to reduce the risks from hazards to the environment and to public health, both long- and short-term. In particular, the environmental engineer is frequently asked to estimate or project future risks, then use science, engineering, and technology to prevent or mitigate them. To accomplish this objective, the risks associated with various hazards must be evaluated and quantified.

Risk analysis is introduced as a tool of the environmental engineer that crosses the boundaries of disciplines. This chapter is not a comprehensive treatise on risk analysis; rather, it includes those elements of risk analysis that an environmental engineer is most likely to understand and use.

RISK

Most pollution control and environmental laws were enacted in the early 1970s in order to protect public health and welfare. Throughout this text, a substance is considered a pollutant if it has been perceived to have an adverse effect on human health. In recent years, increasing numbers of substances appear to pose such threats; the Clean Air Act listed seven hazardous substances between 1970 and 1989, and now lists approximately 300 ! The environmental engineer thus has an additional job: to help determine the comparative risks from various environmental pollutants and, further, which risks it is most important to decrease or eliminate.

Adverse effects on human health are sometimes difficult to identify and to determine. Even when an adverse effect on health has been identified, it is still difficult to recognize those components of the individual's environment that are associated with the adverse effect. Risk analysts refer to these components as *risk factors*. In general a risk factor should meet the following conditions:

- Exposure to the risk factor precedes appearance of the adverse effect.
- The risk factor and the adverse effect are consistently associated. That is, the adverse effect is not usually observed in the absence of the risk factor.
- The more of the risk factor there is, or the greater its intensity, the greater the adverse effect, although the functional relationship need not be linear or monotonic.
- The occurrence or magnitude of the adverse effect is statistically significantly greater in the presence of the risk factor than in its absence.

Identification of a risk factor for a particular adverse effect may be done with confidence only if the relationship is consonant with, and does not contradict, existing knowledge of the cellular and organismic mechanisms producing the adverse effect.

Identification of the risk factor is more difficult than identification of an adverse effect. For example, we are now fairly certain that cigarette smoke is unhealthy, both to the smoker, primary smoke risk, and to those around the smoker, secondary smoke risk. Specifically, lung cancer, chronic obstructive pulmonary disease, and heart disease occur much more frequently among habitual smokers than among non-smokers or even in the whole population including smokers. In the interest of simplifying the problem, we are defining "habitual" smoking as two packs or more per day. The increased frequency of occurrence of these diseases is statistically significant. Cigarette smoke is thus a risk factor for these diseases; smokers and people exposed to secondhand smoke are at increased risk for them.

Notice, however, that we do not say that cigarette smoking causes lung cancer, chronic obstructive pulmonary disease, because we have not identified the actual causes, or etiology, of any of them. How, then, has cigarette smoking been identified as a risk factor if it cannot be identified as the cause ? This observation was not made, and indeed could not be made, until the middle of the twentieth century, when the lifespan in at least the developed countries of the world was long enough to observe the diseases that have been correlated with exposure to cigarette smoke. In the first half of the twentieth century, infectious diseases were a primary cause of death. With the advent of antibiotics and the ability to treat infectious diseases, the lifespan in the developed nations of the world lengthened, and cancer and heart disease became the leading causes of death. In the early 1960s, when the average lifespan in the United States was about 70, lifelong cigarette habitual smokers were observed to die from lung cancer at ages between 55 and 65. This observation, which associated early death with cigarette smoke, identified cigarette smoke as a risk factor.

ASSESSMENT OF RISK

Risk assessment is a system of analysis that includes four tasks:

- Identification of a substance (a toxicant) that may have adverse health effects
- Scenarios foe exposure to the toxicant
- Characterization of health effects
- An estimate of the probability (risk) of occurrence of these health effects.

The decision that the concentration of a certain toxicant in air, water, or food is acceptable is based on a risk assessment.

Toxicants are usually identified when an associated adverse health effect is noticed. In most cases, the first intimation that a substance is toxic is its association with an unusual number of deaths. Mortality risk, or risk of death, is easier to determine for populations, especially in the developed countries, than morbidity risk (risk of illness). All deaths and their apparent causes are reported on death certificates, while recording of disease incidence began in the relatively recent past, and is done only for a very few diseases. Death certificate data may be misleading: an individual who suffers from high blood pressure but is killed in an automobile accident becomes an accident statistic rather than a cardiovascular disease statistic. In addition, occupational mortality risks are well-documented only for men; until the present generation, too few women worked outside the home all their lives to form a good statistical base.

These particular uncertainties may be overcome in assessing risk from a particular cause or exposure to a toxic substance by isolating the influence of that particular cause. Such isolation requires studying two populations whose environment is virtually identical except that the risk factor in question is present in the environment of one population but not of the other. Such a study is called a *cohort study* and may be used to determine morbidity as well as mortality risk. One cohort study showed that residents of copper smelting communities, who were exposed to airborne arsenic, had a higher incidence of a certain type of lung cancer than residents of similar industrial communities where there was no airborne arsenic.

II. Put 5 questions to the text.

Example: ***Why is identification of the risk factor more difficult than identification of an adverse effect ?***

КОНТРОЛЬНА РОБОТА №9

ВАРІАНТ №2

I. Translate this text in writing :

<u>Text</u> REUSE, RECYCLING, AND RESOURCE RECOVERY

Finding new sources of energy and materials is becoming increasingly difficult. Concurrently, we are finding it more and more difficult to locate solid waste disposal sites, and the cost of disposal is escalating exponentially. As a result, society's interest in reuse, recycling, and recovery of materials from refuse has grown.

Reuse of materials involves either the voluntary continued use of a product for a purpose for which is may not have been originally intended, such as the reuse of coffee cans for holding nails, or the extended use of a product, such as retreading automobile tires. In materials reuse the product does not return to the industrial sector, but remains within the public or consumer sector.

Recycling is the collection of a product by the public and the return of this material to the industrial sector. This is very different from reuse, where the materials do not return for remanufacturing. Examples of recycling are the collection of newspapers and aluminum cans by individuals and their collection and eventual return to paper manufacturers or aluminum companies. The recycling process requires the participation of the public, since the public must perform the separation step.

Recovery differs from recycling in that the waste is collected as mixed refuse, and then the materials are removed by various processing steps. For example, refuse can be processed by running it under a magnet that is supposed to remove the steel cans and other ferrous materials. This material is then sold back to the ferrous metals industry for remanufacturing. Recovery of materials is commonly conducted in a *Materials Recovery Facility* (MRF, pronounced "murph") . The difference between recycling and recovery is that in the latter the user of the product is not asked to do any separation, while in the former that crucial separation step is done voluntarily by a person who gains very little personal benefit from going to the trouble of separating out waste materials. Recycling and recovery, the two primary methods of returning waste materials to industry for remanufacturing and subsequent use, are discussed in more detail in the next section.

RECYCLING

Two incentives could be used to increase public participation in recycling. The first is regulatory, in that the government dictates that only separated material will be picked up. This type of approach has had only limited success in democracies like the United States, because dictation engenders public resentment.

A more democratic approach to achieve cooperation in recycling programs is to appeal to the sense of community and to growing concern about environmental quality. Householders usually respond very positively to surveys about prospective recycling programs, but the active response, or participation in source reparation has been less enthusiastic.

Participation can be increased by making source separation easy. The city of Seattle has virtually 100% participation in its household recycling program because the separate containers for paper, cans, and glass are provided, and the householder only needs to put the containers out on the curb. The city of Albuquerque sells, for ten cents each, large plastic bags to hold aluminum and plastic containers for recycling. The bags of recyclables, and bundled newspapers, are picked up at curbside along with garbage. Municipal initiatives like this are costly, however.

A major factor in the success or failure of recycling programs is the availability of a market for the pure materials. Recycling can be thought of as a chain, which can be pulled by the need for post-consumer materials, but which can not be pushed by the collection of such materials by the public. A recycling program therefore includes, by necessity, a market for the materials collected, otherwise the separated materials will end up in the landfill along with the mixed unseparated refuse.

In recent years there has been a strong indication that the public is willing to spend the time and effort to separate materials for subsequent recycling. What has been lacking has been the markets. How can these be created ? Simply put, markets for recycled materials can be created by public demand. If the public insists, for example, on buying only newspapers that have been printed on recycled newsprint, then the newspapers will be forced in their own interest to use recycled newsprint and this will drive up and stabilize the price of used newsprint.

Knowing this, and sensing the mood of the public, industry has been quick to produce products that are touted as being from "recycled this" and "recycled that". Most often, the term "recycled" is used incorrectly in such claims, since the material used has never been in the public sector. Paper, for example, has for years included fibbers produced during the production of envelopes and other products. This waste paper never enters the public sector, but is an industrial waste that gets immediately used by the same industry. This is not "recycling" and such products will not drive the markets for truly recycled materials. The public has to become more knowledgeable about what are and are not legitimate recycled products, and the government may force industries to adopt standards for the use of such terms as "recycled".

RECOVERY

Most processes for separation of the various materials in refuse rely on a characteristic or property of the specific materials, and this characteristic is used to separate the material from the rest of the mixed refuse. Before such separation can be achieved, however, the material must be in separate and discrete pieces, a condition clearly not met by most components of mixed refuse. An ordinary "tin can" contains steel in its body, zinc on the seam, a paper wrapper on the outside, and perhaps an aluminum top. Other common items in refuse provide equally or more challenging problems in separation.

The separation process can be facilitated by decreasing the particle size of refuse, thus increasing the number of particles and achieving a greater number of "clean" particles. The size reduction step, although not strictly materials separation, is commonly a first step in a solid waste processing facility.

II. Put 5 questions to the text.

Example: ***What is a more democratic approach to achieve cooperation in recycling programs ?***

КОНТРОЛЬНА РОБОТА №9

ВАРІАНТ №3

I. Translate this text in writing :

Text SOLID WASTE DISPOSAL

Disposal of solid wastes is defined as placement of the waste so that it no longer impacts society or the environment. The wastes are either assimilated so that they can no longer be identified in the environment, as by incineration to ash, or they are hidden well enough so that they cannot be readily found. Solid waste may also be processed so that some of its components may be recovered, and used again for a beneficial purpose. Collection, disposal, and recovery are all part of the total solid waste management system, and this chapter is devoted to disposal.

DISPOSAL OF UNPROCESSED REFUSE IN SANITARY LANDFILLS

The only two realistic options for disposal are in the oceans and on land. Because the environmental damage done by ocean disposal is now understood, the United States prohibits such disposal by federal law, and many developed nations are following suit. This chapter is therefore devoted to a discussion of land disposal.

Until the mid-1970s, a solid waste disposal facilities was usually a *dump* in the United States and a *tip* (as in "tipping") in Great Britain. The operation of a dump was simple and inexpensive: trucks were simply directed to empty loads at the proper spot on the dump site. The piled-up volume was often reduced by setting the refuse on fire, thereby prolonging the life of the dump. Rodents, odor, insects, air pollution, and the dangers posed by open fires all became recognized as serious public health and aesthetic problems, and an alternative method of refuse disposal was sought. Larger communities frequently selected incineration as the alternative, but smaller towns could not afford the capital investment required and opted for land disposal.

The term *sanitary landfill* was first used for the method of disposal employed in the burial of waste ammunition and other material after World War II, and the concept of burying refuse was used by several midwestern communities. The sanitary landfill differs markedly from open dumps: open dumps are simply places to deposit wastes, but sanitary landfills are engineered operations, designed and operated according to acceptable standards.

Sanitary landfilling is the compaction of refuse in a lined pit and covering of the compacted refuse with an earthen cover. Typically, refuse is unloaded, compacted with bulldozers, and covered with compacted soil. The landfill is built up in units called *cells*. The daily cover is between 6 and 12 inches thick depending on soil composition, and a final cover at least two feet thick is used to close the landfill. A landfill continues to subside after closure, so that permanent structures cannot be built onsite without special foundations. Closed landfills have potential uses as golf courses, playgrounds, tennis courts, winter recreation, 0r parks and greenbelts.

The sanitary landfilling operation involves numerous stages, including siting, design, operation, and closing.

SITING LANDFIIS

Siting of landfills is rapidly becoming the most difficult stage of the process since few people wish to have landfills in their neighborhoods. In addition to public acceptability, considerations include:

- *Drainage*: Rapid runoff will lessen mosquito problems, but proximity to streams or well supplies may result in water pollution.
- *Wind*: It is preferable that the landfill be downwind from any nearby community.
- *Distance from collection*
- *Size*: A small site with limited capacity is generally not acceptable since finding a new site entails considerable difficulty.
- *Rainfall patterns* influence the production of leachate from the landfill.
- *Soil type*: Can the soil be excavated and used as cover ?
- *Depth of the water table*: The bottom of the landfill must be substantially above the highest expected groundwater elevation.
- *Treatment* of leachate requires proximity to wastewater treatment facilities.

- *Proximity to airports*: All landfills attract birds to some extent, and are therefore not compatible with airport siting.
- *Ultimate use*: Can the area be used for private or public use after the landfilling operation is complete ?

Although daily cover helps to limit disease vectors, a working landfill still has a marked and widespread odor during the working day. The working face of the landfill must remain uncovered while refuse is added and compacted. Wind can pick material up from the working face, and the open refuse attracts feeding flocks of birds. These birds are both a nuisance and a hazard to low-flying aircraft using nearby airports. Odor from the working face and the truck traffic to and from the landfill make a sanitary landfill an undesirable neighbor to nearby communities.

Early sanitary landfills were often indistinguishable from dumps, thereby enhancing the “bad neighbor” image. In recent years, as more landfills have been operated properly, it has even been possible to enhance property values with a closed landfill site, since such a site must remain open space. Acceptable operation and eventual enhancement of the property are understandably difficult to explain to a community.

DESIGN OF LANDFILLS

Modern landfills are designed facilities, much like water or wastewater treatment plants. The landfill design must include methods for the recovery and treatment of the leachate produced by the decomposing refuse, and the venting or use of the landfill gas. Full plans for landfill operation must be approved by the appropriate state governmental agencies before construction can begin.

Since landfills are generally in pits, the soil characteristics are of importance. Areas with high groundwater not be acceptable, as would high bedrock formations. The management of rainwater during landfilling operations as well as when the landfill is closed must be part of the design.

II. Put 5 questions to the text.
Example: ***What stages does sanitary landfilling operation involve ?***

Література

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