



Національний університет

водного господарства та
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Міністерство освіти і науки України
Національний університет водного господарства та
природокористування

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АНГЛІЙСЬКА МОВА

Інтерактивний комплекс навчально-методичного
забезпечення

*Кредитно-модульна система організації
навчального процесу*

Для студентів за напрямом підготовки 6.060103
„Гідротехніка” (водні ресурси)
спеціальності „Водопостачання та водовідведення”

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Інтерактивний комплекс призначений для студентів 1 та 11 курсу. Мета посібника – активізувати та систематизувати знання та навички перекладати, реферувати, анотувати тексти за фахом, писати резюме, виробити навички професійно спрямованого усного мовлення в галузі водопостачання та водовідведення. Тексти уроків складені на матеріалі оригінальних джерел фахової літератури. Структура комплексу сприяє успішному засвоєнню навчального матеріалу та розвитку всіх навичок мовленнєвої діяльності.

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ПЕРЕДМОВА

Навчальний посібник призначений для студентів спеціальності “Водопостачання та водовідведення”. В Україні практично немає спеціалізованого посібника англійською мовою з цього фаху, який поєднував би мовний матеріал із чітко визначеним змістом текстів. Мета посібника – допомогти студентам навчитись самостійно читати і перекладати літературу зі спеціальності, викладати свої думки відповідно до запропонованих ситуацій, вести бесіду–діалог та обмінюватися практичною інформацією.

Посібник складається з передмови та 5 уроків. Кожний урок включає два тексти: А та В. Всі тексти оригінальні, взяті з сучасної англомовної технічної літератури, деякі з них частково адаптовані. Вони відображають найактуальніші науково–технічні проблеми фаху. Перший текст призначений переважно для вивчального читання, другий – для ознайомлюваного та переглядового. Кожному тексту передують словник слів і виразів та стислий граматичний коментар, що охоплює найважливіші граматичні явища, характерні для фахово орієнтованих текстів із водопостачання та водовідведення: пасивний стан, неособові форми дієслова, багатокомпонентні означення, словотвір. Вправи до *тексту А* сприятимуть засвоєнню студентами професійно орієнтованої лексики і повторенню граматичного матеріалу. Вони вміщують матеріал двох видів. Передтекстові вправи подають лексичний та граматичний матеріал. Післятекстові вправи закріплюють цей матеріал, а також включають завдання для самоконтролю. Вправи до *тексту В* орієнтують студента на здобуття інформації та самостійне використання мовного матеріалу в мовленнєвій діяльності. Кожний другий урок вміщує також тест з ключами.

Посібник включає тексти для додаткового читання, які можуть бути використані в групах поглибленого вивчення англійської мови та в групах магістрантів, розмовні теми з численними вправами, а також англо–український словник. Добір текстів, розробку системи лексичних вправ та форм контролю виконано з урахуванням цільової установки чинної програми з іноземних мов.

Структура навчальної дисципліни „Іноземна мова за професійним спрямуванням /англійська/”

1. Опис навчальної дисципліни

Предмет: англійська мова

Найменування показників				Напря́м підготовки, освітньо-кваліфікаційний рівень	Характеристика навчальної дисципліни			
денна форма навчання		заочна форма навчання			денна форма навчання		заочна форма навчання	
1-й рік	2-й рік	1-й рік	2-й рік		1-й рік	2-й рік	1-й рік	2-й рік
Кількість кредитів, відповідних ECTS:				<u>Напря́м:</u> 6.060103 „Гідротехніка”	<u>Нормативна</u>			
5,5	2	4,5	3		<u>Рік підготовки:</u>			
<u>Модулів:</u>				<u>За професійним спрямуванням:</u>	1-й, 2-й		1-й, 2-й	
2	1	2	1		<u>Семестри:</u>			
<u>Змістових модулів:</u>				„Водопостачання і водовідведення”	1, 2, 3		1, 2, 3,	
2	1	2	1		<u>Практичні заняття:</u>			
<u>Загальна кількість годин:</u>				Освітньо-кваліфікаційний	86	30	16	12
198	72	162	108		<u>Самостійна робота:</u>			
<u>Тижневих годин для денної форми навчання:</u>				112	42	146	96	
					<u>Вид контролю:</u>			

аудиторних – 2 СРС – 3	<u>рівень:</u>	1 семестр	
	бакалавр	залік	—
<i>Примітка.</i> Співвідношення кількості годин аудиторних занять до самостійної і індивідуальної роботи становить: для денної форми навчання – 45% до 55%. для заочної форми навчання – 12% до 88%.		2 семестр	
		залік	залік
		3 семестр	
		іспит	іспит

2. Мета та завдання навчальної дисципліни

Мета дисципліни курсу полягає в тому, щоб у відповідності до чинної Типової програми („Англійська мова для професійного спілкування”, 2005 р.) сформувати в студентів спеціалізовану англомовну комунікативну компетенцію мінімального рівня розвитку B₂ (незалежний користувач) в галузі читання, говоріння, аудіювання й письма для забезпечення спілкування в професійно-трудовій сфері.

Реалізація вищезазначеної мети здійснюється в процесі вивчення англійської мови протягом одного року для досягнення таких цілей:

– *практична*: формувати у студентів загальні та професійно орієнтовані — комунікативні мовленнєві компетенції (лінгвістичну, соціолінгвістичну і прагматичну) для забезпечення їхнього ефективного спілкування в академічному та професійному середовищі;

– *освітня*: формувати у студентів загальні компетенції (декларативні знання, вміння й навички, компетенцію існування та вміння вчитися); сприяти розвитку здібностей до самооцінки та здатності до самостійного навчання, що дозволить студентам продовжувати навчання в академічному та професійному середовищі як під час навчання у ВНЗ, так і після отримання диплома про вищу освіту;

– *пізнавальна*: залучати студентів до таких академічних видів діяльності, які активізують і далі розвивають увесь спектр їхніх пізнавальних здібностей.

– *розвиваюча*: допомагати студентам у формуванні

загальних компетенцій з метою розвитку їх особистої мотивації (цінностей, ідеалів); зміцнювати впевненість студентів як користувачів мови, а також їх позитивне ставлення до вивчення мови.

– *соціальна*: сприяти становленню критичного самоусвідомлення та вмінь спілкуватися і робити вагомий внесок у міжнародне середовище, що постійно змінюється;

– *соціокультурна*: досягати широкого розуміння важливих і різнопланових міжнародних соціокультурних проблем, для того, щоб діяти належним чином у культурному розмаїтті професійних та академічних ситуацій.

На I курсі (I-II семестри) навчання спрямоване на засвоєння загальноспеціальної лексики (напрям „Гідротехніка”, спеціальність „Водопостачання та водовідведення”), повторення та систематизацію граматичних форм активного граматичного мінімуму. На основі цього мовного матеріалу формуються навички оперування ним при творенні й сприйнятті мовлення. Одночасно удосконалюються фонетичні навички.

II курс (III семестр) – це етап вузької спеціалізації. Тексти мають практичний та науковий інтерес для студентів даного фаху. Крім того, на даному етапі повторюються та систематизуються знання неособових форм дієслова (The Infinitive, The Gerund, The Participle), які належать до пасивного граматичного мінімуму. Ознайомлення з пасивним граматичним мінімумом має на меті допомогти студентам зрозуміти певне граматичне явище під час читання, тобто, насамперед, розпізнати це явище за його формою та співвіднести її з відповідним значенням.

В результаті засвоєння мовного матеріалу та розвитку мовленнєвих вмінь студенти **повинні бути здатними**:

– обговорювати навчальні та пов’язані зі спеціалізацією питання, для того щоб досягти порозуміння зі співрозмовником;

– готувати виступи з галузевих питань, застосовуючи

відповідні засоби вербальної комунікації та адекватні форми ведення дискусій і дебатів;

- знаходити нову текстову, графічну, аудіо- та відео- інформацію, що міститься в англомовних галузевих матеріалах (як друкованому, так і в електронному вигляді);

- аналізувати англомовні джерела інформації;

- писати есе;

- анотувати та реферувати англомовні професійні тексти рідною та англійською мовами;

- перекладати англомовні професійні тексти на рідну мову, користуючись двомовними термінологічними словниками.

Після закінчення курсу навчання студенти **повинні знати:**

- граматичні структури, що є необхідними для гнучкого вираження відповідних функцій та понять, а також для розуміння і продукування широкого кола текстів в академічній та професійній сферах;

- правила англійського синтаксису, щоб дати можливість розпізнавати і продукувати широке коло текстів в академічній та професійній сферах;

- мовні форми, властиві для офіційних та розмовних реєстрів академічного і професійного мовлення;

- широкий діапазон словникового запасу (у тому числі термінології), що є необхідним в академічній та професійній сферах.

3.1. Тематичний план та розподіл навчального часу

Блоки змістовних модулів (уроки)	Розподіл навчального часу			
	Практичне заняття		Самостійна робота	
	ДФН	ЗФН	ДФН	ЗФН
I семестр				
Lesson 1. Hydrologic cycle. Passive Voice.	20	2	2	26
Lesson 2. Sources of water.	18	2	25	28

Wordbuilding				
Additional reading	2	2	5	16
Разом	40	6	50	70
II семестр				
Lesson 3. Water pollution in the USA. Gerund.	22	4	28	30
Lesson 4. Water and air pollution.	22	4	30	30
Additional reading	2	2	4	16
Разом	46	10	62	76
III семестр				
Lesson 5. Continuous countercurrent filtration system. Terminology.	20	6	30	40
My future speciality	8	4	7	40
Additional reading	2	2	5	16
Разом	30	12	42	96
Разом за курс	116	28	154	242

3.2. Програмний матеріал блоків змістових модулів

Змістовий модуль I

Lesson 1. Hydrologic Cycle. Passive Voice

Тема 1. Hydrologic Cycle. Passive Voice.

Систематизація знань про пасивний стан дієслів: виконання вправ для самоконтролю (впр.1-8). Ознайомлення з фаховою лексикою тексту (впр. 1-1-7).

Тема 2. Hydrologic Cycle. Passive Voice.

Вивчальне читання фахового тексту (впр. 1-9).

Тема 3. Hydrologic Cycle. Passive Voice.

Вивчальне читання фахового тексту. Розвиток навичок монологічного мовлення.

Тема 4. Hydrologic Cycle. Passive Voice.

Вивчальне читання фахового тексту. Розвиток навичок діалогічного мовлення (впр. 1-10).

Тема 5. Hydrologic Cycle. Passive Voice.

Вивчальне читання фахового тексту. Розвиток навичок анотування (впр. 1-11, 12).

Тема 6. Hydrologic Cycle. Passive Voice.

Підсумкове заняття: автоматизація мовних і мовленнєвих навичок (впр. 11-1-4).

Тема 7. Water.

Переглядове читання. Розвиток навичок аудіювання (впр. 11-1-3).

Тема 8. Water.

Розвиток навичок реферування тексту.

Тема 9. Role Play „Hydrologic Cycle”.

Розвиток навичок діалогічного мовлення.

Тема 10. Проміжний контроль: тестове завдання.

Змістовий модуль II

Lesson 2. Sources of Water. Wordbuilding.

Тема 1. Sources of Water. Wordbuilding.

Систематизація знань про словотвір (впр. 1-2-3). Виконання вправ для самоконтролю (1-6). Ознайомлення з фаховою лексикою тексту (впр. 1-1,5)

Тема 2. Sources of Water. Wordbuilding.

Вивчальне читання фахового тексту (впр. 1-7)

Тема 3. Sources of Water. Wordbuilding.

Вивчальне читання фахового тексту. Розвиток навичок монологічного мовлення (впр. 1-8).

Тема 4. Sources of Water. Wordbuilding.

Вивчальне читання фахового тексту. Розвиток навичок діалогічного мовлення (впр. 11-3).

Тема 5. Sources of Water. Wordbuilding.

Вивчальне читання фахового тексту. Розвиток навичок анотування (впр. 1-9).

Тема 6. Sources of Water. Wordbuilding.

Підсумкове заняття: автоматизація мовних і мовленнєвих навичок (впр. 11-1-2).

Тема 7. Water Famine: Reality or Illusion?

Переглядове читання. Розвиток навичок аудіювання (впр. 111-1-3).

Тема 8. Проміжний контроль. МКР.

Тема 9. Role Play „Water Resources”.

Розвиток навичок діалогічного мовлення.

Тема 10. Additional Reading.

Виконання комунікативних і евристичних вправ.

Змістовий модуль III

Lesson 3. Water Pollution in the USA. Gerund.

Тема 1. Water Pollution in the USA. Gerund.

Систематизація знань про герундій. Виконання вправ для самоконтролю (впр. 5-1-1V). Ознайомлення з фаховою лексикою уроку (впр. 1-4).

Тема 2. Water Pollution in the USA. Gerund.

Вивчальне читання фахового тексту (впр. 6).

Тема 3. Water Pollution in the USA. Gerund.

Вивчальне читання фахового тексту. Розвиток навичок монологічного мовлення.

Тема 4. Water Pollution in the USA. Gerund.

Вивчальне читання фахового тексту. Розвиток навичок діалогічного мовлення (впр.7).

Тема 5. Water Pollution in the USA. Gerund.

Вивчальне читання фахового тексту. Розвиток навичок анотування (впр.8).

Тема 6. Water Pollution in the USA. Gerund.

Вивчальне читання фахового тексту. Автоматизація мовних і мовленнєвих навичок (впр. 11-1-3).

Тема 7. Water Pollution in the USA. Gerund.

Підсумкове заняття.

Тема 8. Проміжний контроль. МКР.

Тема 9. Snow Storage.

Переглядове читання. Розвиток навичок аудіювання (впр. 111-1-2).

Тема 10. Role Play „Pollutants in Pennsylvania”.

Розвиток навичок діалогічного мовлення.

Тема 11. Тестове завдання.

Змістовий модуль IV

Lesson 4. Water and Air Pollution.

Тема 1. Water and Air Pollution.

Вивчальне читання фахового тексту. Ознайомлення з фаховою лексикою тексту (впр. 1-1-3). Виконання вправ для самоконтролю (впр.1-4).

Тема 2. Water and Air Pollution.

Вивчальне читання фахового тексту (впр.1-5).

Тема 3. Water and Air Pollution.

Вивчальне читання фахового тексту. Розвиток навичок монологічного мовлення.

Тема 4. Water and Air Pollution.

Вивчальне читання фахового тексту. Розвиток навичок діалогічного мовлення (впр.1-6).

Тема 5. Water and Air Pollution.

Вивчальне читання фахового тексту. Розвиток навичок анотування (впр.1-7).

Тема 6. Підсумкове заняття: автоматизація мовних і мовленнєвих навичок (впр. 11-1-3).

Тема 7. First Water Supply Systems.

Розвиток навичок аудіювання (впр.111-1-3).

Тема 8. First Water Supply Systems.

Розвиток навичок анотування.

Тема 9. Role Play „Types of Water”.

Розвиток навичок діалогічного мовлення.

Тема 10. Role Play „Types of Water”.

Розвиток навичок написання есе.

Тема 11. Проміжний контроль. МКР.

Тема 12. Additional Reading.

Змістовий модуль V

Lesson 5. Continuous Countercurrent Filtration System.

Terminology.

Тема 1. Continuous Countercurrent Filtration System. Terminology.

Систематизація знань про терміни. Ознайомлення з фаховою лексикою тексту (впр. 1-1-4). Виконання вправ для самоконтролю (впр.5-1-4).

Тема 2. Continuous Countercurrent Filtration System. Terminology.

Вивчальне читання фахового тексту (впр. 1-6).

Тема 3. Continuous Countercurrent Filtration System. Terminology.

Вивчальне читання фахового тексту. Розвиток навичок діалогічного мовлення (впр. 1-7).

Тема 4. Continuous Countercurrent Filtration System. Terminology.

Вивчальне читання фахового тексту. Розвиток навичок анотування (впр. 1-8).

Тема 5. Continuous Countercurrent Filtration System. Terminology.

Підсумкове заняття. Автоматизація мовних і мовленнєвих навичок (впр. 11-1-2).

Тема 6. My Future Speciality.

Ознайомлення з лексикою теми.

Тема 7. My Future Speciality.

Вивчальне читання теми (впр.2).

Тема 8. My Future Speciality.

Вивчальне читання теми. Розвиток навичок діалогічного мовлення (впр. 3-5).

Тема 9. My Future Speciality.

Вивчальне читання теми. Розвиток навичок монологічного мовлення (впр. 6-8).

Тема 10. My Future Speciality.

Підсумкове заняття.

Тема 11. Moscow Drinking Water.

Переглядове читання.

Тема 12. Moscow Drinking Water.

Діалогічне мовлення.

Тема 13. Role Play „Water Supply Systems”.

Розвиток навичок діалогічного мовлення.

Тема 14. Тестове завдання.

Тема 15. Additional Reading.

4. Розподіл балів що присвоюються студентам

4.1. Розподіл балів що присвоюються студентам (Ісеместр) /залік/

Поточне тестування та самостійна робота										Сума
Змістовний модуль І					Змістовний модуль ІІ					
T _{1,2}	T _{3,4}	T _{5,6}	T _{7,8}	T _{9,10}	T _{1,2}	T _{3,4}	T _{5,6}	T _{7,8}	T _{9,10}	
10	10	10	10	10	10	10	10	10	10	100
50					50					

4.2. Розподіл балів, що присвоюються студентам (ІІсеместр) /залік/

Поточне тестування та самостійна робота												Сума
Змістовний модуль III						Змістовний модуль 4						
T _{1,2}	T _{3,4}	T _{5,6}	T _{7,8}	T _{9,10}	T ₁₁	T _{1,2}	T _{3,4}	T _{5,6}	T _{7,8}	T _{9,10}	T _{11,12}	
8	8	8	10	12	2	8	8	8	8	8	12	100
48						52						

4.3. Розподіл балів що присвоюються студентам (ІІІсеместр) /екзамен/

Поточне тестування та самостійна робота															Сума
Змістовний модуль 5															
T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃	T ₁₄	T ₁₅	
6	6	6	6	6	6	8	8	8	6	6	6	8	6	8	100

5.Шкала оцінювання в КМСОНП та ECTS

Сума балів за всі форми навчальної діяльності	Оцінка в ECTS	Для іспиту	Для заліку
90 – 100	A	відмінно	зараховано
64-73	D	задовільно	
60-63	E		
35-59	FX	незадовільно з можливістю повторного складання	не зараховано з можливістю повторного складання
0-34	F	незадовільно з обов'язковим повторним вивченням дисципліни	не зараховано з обов'язковим повторним вивченням дисципліни

6.Методичне забезпечення

1. Програма з англійської мови для професійного спілкування К.: Ленвіт, 2005 Рекомендовано Міносвіти і науки України.
2. Верба Г.В. Граматика сучасної англійської мови К.: Логос, 2004 – 341 с.
3. Вакуленко О.Л., Косолапов В.І., Красовська А.М. Англійська мова. Навчальний посібник – Рівне, УПВГ, 1995 – 106 с.
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6. 086-105. Навчальні завдання з проведення ділових ігор для студентів спеціальностей 7.092601, 7.070801, 7.070904. Косолапов В.І. Рівне: РДТУ, 1999. 24 стор.
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8. Указатель терминов и покращений по охране окружающей среды. М.: ВИНТИ, 1986.

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LESSON ONE

Пасивний стан дієслова

Якщо підметом речення є об'єкт дії, то дієслово-присудок вживається в пасивному стані:

This school was built after the war.

Ця школа була побудована після війни.

Усі часові форми пасивного стану в англійській мові утворюються з відповідних часів допоміжного дієслова to be та дієприкметника минулого часу основного дієслова.

Present Indefinite Passive: I am examined

He (she, it) is examined.

We (you, they) are examined

Past Indefinite Passive: I (he, she, it) was examined

Future Indefinite Passive I (we) shall be examined

He (she, it, you, they) will be examined

Present Continuous Passive: I am being examined

He (she, it) is being examined

We (you, they) are being examined

Past Continuous Passive: I (he, she, it) was being examined

We (you, they) were being examined

Future Continuous в пасивному стані не вживається.

Present Perfect Passive: I (we, you, they) have been examined:

He (she, it) has been examined

Past Perfect Passive I (he, she, it, we, you, they) had been examined

Future Perfect Passive: I (we) shall have been examined

He (she, it, you, they) will have been examined

Часові форми групи Perfect Continuous у пасивному стані не вживаються У питальній формі допоміжне дієслово (або

при складеній формі перше допоміжне дієслово) ставиться перед підметом: Where was this book published? Де була видана ця книга? When will the telegram be sent? Коли буде відправлено телеграму?

У заперечній формі частка not ставиться після допоміжного дієслова (або при складеній формі допоміжного дієслова після першою допоміжного дієслова)

The bridge has not yet been built.

He was not sent there.

Часові форми пасивного стану вживаються за тими самими правилами що й відповідні часи активного стану.

Переклад речень у дієсловом у пасивному стані

На українську мову дієслова в пасивному стані перекладаються: а/дієсловом з часткою-ся/-сь/

His voice was heard at the door.

Біля дверей почувся його голос.

б/словосполученням дієслова бути з дієприкметником пасивного стану минулого часу

Where did you get the copies which were found in your room? Де ви дістали ті примірники, які були знайдені у вашій кімнаті?

в/сполученням дієслова бути з дієслівними формами на -но,-то в безособових реченнях:

That house was built last year.

Той будинок було збудовано торік.

г/дієсловом в активному стані в неозначено - особових реченнях:

She had not been seen.

Її не бачили.

д/якщо в реченні з дієсловом у пасивному стані вказано суб'єкт дії, його можна перекласти українською мовою особовим реченням з дієсловом в активному стані:

They were invited by my friend.

Їх запросив мій друг.

I. Vocabulary and reading comprehension

1. Read the following international words and give their Ukrainian equivalents:

total amount; minerals of our planet; hydrological cycle; solar radiation; diffusion of water; radioactive material; industrial smoke; the stages of the cycle; atmospheric dust; global evaporation; final stage; to balance condensation; the ocean of air; on a large scale; the air masses; by transpiration; a very small proportion; this process: form and composition; cubic miles; continents.

2. Define meanings of the following words by suffixes:

1)to use, the use, used, usable; 2)to divide, division, divided, divisible; 3)to vary, variation, variable, invariable ; 4)to move,movement,. moved, movable; 5)to compare, comparison, compared, comparable; 6)to permeate, permeability, permeable; 7)to measure, measurement, measured, measurable.

3.Write down words in synonymic pairs:

to take place, to return, to occur, to come back, to cause, to use, to make use of, to force, average, downwards, under, upwards, upward, beneath, downward.

4.Find in the text antonyms to the following words:

to increase, little, pure, rarely, usable, approximately, to cool, condensation, to fall, initial, to condensate, beginning, sooner, gradually.

5.Arrange the following nouns in the order corresponding to the hydrological cycle:

runoff, precipitation, evaporation, infiltration and ground water: stream flow, reprecipitation.

6. Read aloud and memorize the following words necessary to comprehend the text:

act - діяти
an average of - в середньому
approximately – приблизно
as - тому що
assume - набувати
available - що є в наявності
balance – зрівноважувати
beneath - під
cause – спричиняти, примушувати
change - змінювати
comparatively – порівняно
composition - склад
constant – постійний
contain – містити в собі, вміщати
cool - охолоджувати
diminish – зменшувати
directly - безпосередньо
divisible - той що ділиться
estimate – підраховувати
evaporate – випаровувати
exactly - точно
flow – потік, текти
glacier – льодовик
heat – нагрівати
inch - дюйм
increase – збільшувати, зростати
intervene - втручатися
pollute – забруднювати
invariable - незмінний
lock away – замкнути
moisture - волога

moreover - більш того

move – рухатись

occur - відбуватись, попадатися

particles - частинка

permeate - просочуватись

plant - рослина

precipitate – осаджувати, опадати

pure - чистий

rainfall – опади

reach – досягати

readily - легко, без труднощів

release - випускати

remain - залишатись

render - робити, перетворювати

return – повертатися

root – корінь

run - текти

runoff- стік

sink - опускатися

soil – земля, ґрунт

something like - приблизно

soot – сажа

subsequently -згодом, потім

suddenly - раптом

supply – постачання, постачати

take up - поглинати

the only - єдиний

transport – переносити, переміщати

usable - придатний для використання

vegetation -рослинність

waterfall - падіння води

wind - вітер

7. Expressions for the text comprehension:

atmospheric dust – атмосферний пил
air masses – повітряні маси
a great deal of – велика кількість
a number of – ряд, кілька
a variety of – цілий ряд
cubic miles – кубічні милі
cyclical movement – циклічний рух
domestic smoke – побутовий дим
final stage – кінцева стадія
fresh water – прісна вода
great distances – великі відстані
hydrologic cycle – гідрологічний цикл
ice caps – льодові шапки
industrial smoke – промисловий дим
industrial waste – промислові відходи
lake water – озерна вода
land surfaces – земні поверхні
later stage – пізніша стадія
main stages – головні стадії
make use of – використовувати
most of - більшість
neither ... nor – ні ... ні ...
out of man's reach – поза межами
radioactive – радіоактивний матеріал
rock materials – скальні матеріали
second stage – друга стадія
small proportion – мала частина
snow fields – снігові поля
solar radiation – сонячна радіація
sooner or later – рано чи пізно
surface layers – поверхневі шари
surface runoff - поверхневий стік
the only stage – єдина стадія
take place – відбуватися, мати місце

total amount – загальна кількість
total global evaporation - загальне
глобальне випаровування
total precipitation – загальні опади
underground water – ґрунтова вода
water vapour – водяна пара

8. Exercises for self-control

1 Insert the words in the passive voice:

1. Rainfall ... by vegetation (transpire). 2. Water ... by the roots of vegetation (take up). 3. Water ... by industrial wastes (pollute). 4. The process ... as the hydrologic cycle (know). 5. The evaporation ... by the precipitation (balance). 6. The air masses ... (cool). 7. Water vapour ... at great distances (transport). 8. 80 thousand cubic miles of water ... each year (evaporate). 9. The total amount of water cannot ... (increase). 10. Water from vegetation ... by transpiration (release).

11. Find English equivalents:

- | | |
|-----------------------|----------------------|
| 1. водяна пара | 1. domestic smoke |
| 2. поверхневий шар | 2. surface layer |
| 3. озерна вода | 3. cubic mile |
| 4. повітряні маси | 4. solar radiation |
| 5. кубічна миля | 5. air masses |
| 6. сонячна радіація | 6. water vapour |
| 7. побутовий дим | 7. lake water |
| 8. гідрологічний цикл | 8. total amount |
| 9. загальна кількість | 9. final stage |
| 10. кінцева стадія | 10. hydrologic cycle |

111. Find Ukrainian equivalents:

- | | |
|-------------------|--------------------|
| 1. snow field | 1. великі відстані |
| 2. surface runoff | 2. льодова шапка |

- | | |
|-------------------------|---------------------------|
| 3. land surface | 3. підземна вода |
| 4. total precipitation | 4. радіоактивний матеріал |
| 5. small proportion | 5. циклічний рух |
| 6. cyclical movement | 6. снігове поле |
| 7. radioactive material | 7. земна поверхня |
| 8. great distances | 8. загальні опади |
| 9. underground water | 9. мала пропорція |
| 10. ice cap | 10. поверхневий стік |

IV. Match definitions:

- | | |
|------------------|---|
| 1. moisture | 1. the useless materials, substances, or paper that are left after you use them |
| 2. transpiration | 2. a small amount of water or another liquid in the air, on the surface of something, or in a substance |
| 3. radiation | 3. rain, hail, snow formed in the atmosphere |
| 4. precipitation | 4. not salty water |
| 5. fresh water | 5. a large mass of ice which moves slowly down a mountain valley |
| 6. dust | 6. plants in general |
| 7. evaporation | 7. heat or light that is sent out but that you cannot see |
| 8. glacier | 8. the process in which water passes from the surface of a plant into the air |
| 9. vegetation | 9. very small pieces of dirt that cover surfaces inside buildings like a powder |
| 10. waste | 10. the process of changing water into steam |

9. Read the text and carry out the following assignments:

- find the paragraph describing the first stage of the hydrological cycles;
- find the sentences telling about the evaporation of water;
- choose the best Ukrainian title expressing the main idea of

Text A

Hydrologic Cycle

The total amount of water contained in our planet is constant and invariable and can neither be increased nor diminished. It assumes a variety of forms, such as the oceans, moisture vapour, fresh water, lake water and ice. As most of this water is locked away in oceans, in snow fields, ice caps and glaciers, only a small proportion is available in a form readily usable by man. Moreover, a great deal of the water in and on the land is polluted by minerals or by industrial waste and rendered unusable.

Of the water contained in the oceans, a very small proportion daily changes its form and composition and is moved to the land, where it can be used by and from where it returns to the oceans. This process, which has no beginning and no end, is known as the hydrologic cycle. It is estimated that something like 80,000 cubic miles of water are evaporated each year from oceans, together with approximately 15,000 cubic miles of water evaporated from lakes, rivers, canals and land surfaces of the continents. This total global evaporation is exactly balanced by the total precipitation in the form of waterfall on the land surfaces and on the oceans. This cyclical movement of water is divisible into three main stages. Firstly, solar radiation, acting upon the surface of the oceans, heats the surface layers and causes evaporation and the diffusion of water vapour upwards into the atmosphere. The water vapour, which at this stage is pure, is then transported at great distances by winds. During its movement across oceans and over the land, it may become polluted in a variety of ways: by atmospheric dust, by particles of radioactive material or by industrial and domestic smoke and soot.

In the second stage of the cycle, the air masses containing the water vapour are suddenly cooled. This cooling, which may occur for a number of reasons, causes condensation to take place and rain or snow to be precipitated. Of this precipitation, some falls directly into the oceans, out of man's reach and some is too polluted to be usable.

The third and final stage is that in which the water moves back, over and under the land, into the oceans from which it came. Of the water

which falls upon the land, some flows over the surface. some sinks into the soil, and some is taken up by the roots of vegetation to be used by plants and subsequently released into the atmosphere by transpiration. If for example, an average of thirty inches of rainfall reaches the land surface each year, approximately twenty-one inches will evaporate directly or be transpired by vegetation. Of the remaining nine inches, most will run directly to the oceans as surface runoff or permeate the rock materials beneath the surface to form underground water and. at later stage, indirectly reach oceans. Water which began in oceans sooner or later returns to them.

The only stage is the cycle at which man can , at present, intervene and make use of the water on a large scale is the third, and only then if the water is comparatively pure.

10. Answer the following questions on the text.

1. What forms does water assume in our planet?
2. How much water is evaporated from oceans each year?
3. What does solar radiation do in the hydrological cycle?
4. What is water vapour polluted by?
5. What causes water condensation?
6. What is occurring with the water falling upon the land?

11.Suggest subtitles for each paragraph of the text.

12.Express the main idea of the text in Ukrainian in the shortest possible way.

II. Structure and written expression.

1. Write out the text sentences with verbs in passive form and translate them into Ukrainian.

2. Translate into English using passive voice forms:

1. Вода забруднена промисловики стоками.
2. Вода випаровується з океанів, озер, річок, каналів та

3. Водяна пара передається на далекі відстані вітрами.
4. Частина води поглинається рослинністю.

3. Make up questions to have the following answers:

1. Most of water is locked away in oceans, snow fields, ice caps and glaciers.
2. Approximately 15.000 cubic miles of water are evaporated from lakes, rivers, canals and land surfaces.
3. The cyclical movement of water is divisible
4. This cooling causes the condensation to take place.

4. Find in the text sentences corresponding to Ukrainian ones:

1. Сонячна радіація, що діє на океанську поверхню, нагріває поверхневі шари і спричиняє рух випаровування.
2. Вода рухається назад, над та під землею в океани, звідки вона прийшла.

III Listening comprehension

1. Expressions for the text comprehension:

about 60 per cent – приблизно 60 відсотків
average depth – середня глибина
convenient water – зручна вода
dry cement – сухий цемент
enormous quantities – величезні кількості
gigantic projects - гігантські проекти
clean water – чиста вода

ground water – ґрунтова вода

in fact – фактично

man' use – використання людиною

modern methods – сучасні методи

plentiful water – рясна вода

raw water – необроблювана вода

settle down – поселятись

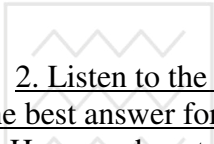
surface water – поверхнева вода

three hours' walk away – на відстані трьох годин ходьби
пішки

water supply – водопостачання

watery food – водяниста їжа

woollen cloth – вовняний одяг

 **2. Listen to the tape-recorded text below and be ready to choose the best answer for the following questions:**

1. How much water does human body contain?
2. How much water do we need to produce one kilogram of petrol?
3. How much water do we need to produce one ton of steel?
4. How much water do we need to produce one kilogram of paper?
5. What can you say about surface water in Africa?

Text B

Water

There is no life without water. Man can live without clothes, without shelter, and even for time without food. Without water he soon dies. All his food contains water from about 60 per cent in meat to 95 per cent in watery fruit. His body is about 70 per cent water. The air surrounding him contains enormous quantities of water in the form of vapour. The surface of the earth is 70 per cent water, to an average depth of over 4 kilometers. And yet man often does not have enough water.

Water led man forward. Water, in fact, was at the roots of civilization-people settled down on the banks of great rivers.

Industry is thirsty, too. We need 10 litres of water to produce one litre of petrol, 100 litres to produce one kilogram of paper, 600 litres to produce one kilogram of woollen cloth, 3,500 litres to produce one ton of dry cement and 20,000 litres to produce one ton of steel.

In Africa, where surface water is scarce and ground water unobtainable, women spend most of their time carrying water from springs and rivers which are sometimes as much as 19 kilometers or three hours' walk away

The earth has as much water as it ever had. What can man do to provide enough water for life?

There are new methods of treating raw water, filtration, chlorination. There are modern methods of collecting, pumping, storing and distributing water. There are gigantic projects of taming the rivers, of harnessing their strength to produce power for man's use, preventing floods and using the water for increasing the harvest of the land and providing food for the growing population of the world. Perhaps a practical way will be found of making the rain fall where it is most needed.

A clean, plentiful and convenient water supply in all parts of the world must be provided.

3. Render the text either in English or in Ukrainian.

4. Do you know that:

- River water has a 12- day replacement cycle.
- Glaciers replacement cycle is 8,500 years.
- Annual evaporation from the Earth surface amounts to over half a million cubic kilometers of water.
- The atmospheric moisture is renewed every ten days on the average.

TEST

1. Insert the necessary words or word expressions

1. The total amount of water in our planet is ...
2. A great deal of water is polluted by ...
3. The cyclic movement of water ... into three main stages.
4. Solar radiation ... the surface layers.
5. Approximately 15000 cubic miles of water ... from lakes, rivers and land surfaces.
6. The water vapour ... by winds.
7. The cooling of air causes ...
8. An average of thirty inches of rainfall ... the land surface.
9. The total global evaporation is balanced by the total ...
10. Most of water ... in oceans, snow fields, ice caps and glaciers.

11. Indicate Ukrainian equivalents:

1. total amount; 2. approximately; 3. atmospheric dust; 4. domestic smoke 5. surface runoff; 6. underground waters; 7. on a large scale; 8. rock materials; 9. unusable; 10. fresh water.

111. Indicate English equivalents:

1. водянисті фрукти, 2. вовняний одяг, 3. сучасні методи, 4. водопостачання, 5. на великі відстані, 6. повітряні маси, 7. кінцева стадія, 8. поглинати, 9. чиста вода, 10. гідрологічний цикл.

1V. Use the proper tense form:

1. Water ... a variety of forms (is assumed, assumes). 2. Some water ... by the roots of vegetation (is taken up, takes up). 3. The cooling of air masses ... condensation (is caused, causes). 4. This process ... as the hydrologic cycle (is known, knows). 5. Some water ... directly to the oceans as surface runoff (runs, is run). 6. Most water ... in oceans (contains, is contained). 7. Air masses ... water vapour (is contained, contains). 7. Raw water ... by modern

methods (is treated, treats). 8. We ... power for man's use. (ate produced, produce). 9. The population of the world (is grown, grows). 10. A clean water supply must ... (is provided, be provided).

V. Answer the following questions:

1. Can you drink ocean water? 2. How does river water differ from sea water? 3. How does water form clouds? 4. How does most water reach Earth? 5. What are some sources of water on Earth? 6. What role do plants have in the water cycle? 7. Is water an element or compound? 8. How do oceans affect weather? 9. What is desalination? 10. How is desalination most often done/?



Lesson Two
Word-building (словотвір)
Найуживаніші суфікси

I. Суфікси іменників

А. На означення національності, професії, особи-виконавця дії, або знаряддя дії

- ian	Ukrainian- українець librarian- бібліотекар
- ent, - ant	student - студент assistant- помічник
- ist	specialist- спеціаліст
- or, -er	inventor - винахідник driver - водій

Б. На означення абстрактних понять процесів, дії тощо

- age	passage- проходження leakage - теча
- ance . – ence	resistance - опір

- ancy , - ency

- ion
(-ation,-tion
- ion,-asion)

-ism
- ment
- ness
- ty, -ity

- th
-ure
(-ture, - sure
-ssure)
- ic, -ics

-ship
-ate

II.Суфікси прикметників

- able,- ible

- al
- ent, - ant

- ful
- less
- ic
- ive
- ou
- y
- ate

difference - різниця
 constancy- постійність
 efficiency- ефективність
 collection - збірка
 production- виробництво
 dictation- диктування, диктант
 division - поділ, ділення
 transmission -передача
 optimism- оптимізм
 requirement - вимога
 usefulness - корисність
 safety - безпека
 speciality - спеціальність
 length - довжина
 mixture - суміш
 measure - міра
 pressure - тиск
 mathematics - математика
 characteristics характеристика
 friendship - дружба
 delegate - делегат

measurable- вимірний
 possible - можливий
 industrial- промисловий
 different - різний
 important- важливий
 useful - корисний
 useless - некорисний
 historic - історичний
 active - активний
 dangerous - небезпечний
 dirty - брудний
 separate - окремий

III. Суфікси числівників

- teen	sixteen - шістнадцять
- ty	seventy - сімдесят
- th	the fiftieth- п'ятдесятити

IV. Суфікси дієслів

- ate	communicate- повідомляти
- ute	contribute- вносити -
- en	strengthen- зміцнювати
- (i)fy	solidify - твердіти

V. Суфікси прислівників

- ly	rapidly - швидко
- ward(s)	forward- уперед

Найуживаніші префікси

Префікси з протилежним значенням

un-	unequal- нерівний
in- (il-,ir,-im)	indirect- непрямий
	illiterate- неграмотний
	irregular- неправильний
	impossible- неможливий
dis -	disorder- безпорядок
de-	demobilize - демобілізувати
non-	non-conductor - непровідник

ПРЕФІКСИ З РІЗНИМИ ЗНАЧЕННЯМИ

re-	reconstruct- перебудувати
mis-	misunderstand - неправильно зрозуміти
en-	enrich - збагачувати
over-	overload- перевантаження
under-	underground.- підземний
co-	cooperation- співробітництво
inter-	interaction- взаємодія
sub-	submarine- підводний човен
pre-	prefabricated- виготовлений завчасно
post-	post-war- післявоєнний

Vocabulary and reading comprehension

1. Read the following international words and give their Ukrainian equivalents :

hydrostatic pressure ; the lower limit of the zone; rock formation; a wet period; hydroelectricity; successful method; potential source; salt water ; the process of distillation ;flood control; modern dam; in practice; gigantic reservoir; atmospheric water; surface drainage; by gravity; isolated examples ; porous rock; normal flow ; economic method;

2.Translate the following into Ukrainian defining word meanings by wordbuilding affixes: interdependent process ; subsurface water ; underlyingrock; uneven surface; usable waterж underground water; unfortunately.

3.Translate the following words into Ukrainian paying attention to suffixes of adjectives and adverbs :

significant, sufficient, successful ;significantly ;available; atmospheric;important; particularly; permeable ; phreatic ; porous; normal; relatively;gigantic; economic; serious; initial; necessarily ; appreciable; potential.potable; possible, recently, likely; usable; artificial; primarily ; frequently;natural; mutually; exclusive.

4.Memorize the following words necessary to comprehend the texts

above- над
advantage - перевага
amount - кількість
appreciable - значний
area - територія ,площа
artificial - штучний
bear - нести
become - ставати
call - називати

certain - певний
chief - головний
cloud - хмара
condense – конденсуватись
content- вміст
creation - створення
depth - глибина
derive -отримувати
desalination -опріснення
develop - розробити
devise- винаходити
direct - направляти
dry - сухий
enter - ввійти
everywhere - всюди ,скрізь
fall - падати ,випадати
find- знаходити
foot -фут
free - вільний
however - проте
likely- ймовірно
important - важливий
initial- початковий
islan- острів
lack - відчувати нестачу
lie - полягати в .
lower - нижній
maintain - підтримували
mile - миля
necessarily - неминуче
need - потребувати
obstacle - перешкода
particularly - особливо
penetrate - проникати, попадати
permeable- проникливий
phreati - ґрунтовий
point - точка, місце, пункт

dense - густий, щільний

potable - питний

pressure - тиск

produce - виробляти

promote- сприяти

purpose - ціль, мета

quantity - кількість

rapidly - швидко

recently - недавно

relatively - відносно

retain - утримувати

rise- підвищення

rock - порода

saline -сольовий

salt - сіль

saturation- насичення

so... that - так ... що

sometimes - інколи

source - джерело

stream - струмок

subterranean - підземний

successful - вдалий

table- рівень

tap – починати, освоювати

together with - разом з

unfortunately- на жаль

uniform - рівномірний

upper - верхній

vary - коливатися, змінюватися

we- вологий

well- свердловина, колодязь

while- хоча

yet - проте

5.Expressions for the text comprehension:

a few - декілька

appreciable amounts – помітні кількості
artificial precipitation – штучні опади
atmospheric water – атмосферна вода
by far - набагато
domestic purposes – побутові цілі
dry out - висихати
earth's water – вода землі
economic method – економічний метод
either ... or – чи ...чи, або ...або
for this reason – на цій підставі
fresh water – прісна вода
general sources – загальні джерела
gigantic reservoir – гігантська водойма
greater proportion – більша частина
ground water – ґрунтова вода
hydrostatic pressure – гідростатичний тиск
in practice – на практиці
initial obstacle – початкова перешкода
inland seas – внутрішні моря
land surface – земна поверхня
large-scale method – великомасштабний метод
largest source – найбільше джерело
lower limit – нижня межа
major advantage – головна перевага
on a large scale – у великому масштабі
permeable rocks – проникні породи
phreatic surface – фреатична поверхня
porous rock – пориста порода
potential source – потенціальне джерело
rock formation – скальне утворення
saline content – вміст солі
salt water - солоня вода
subsurface water – під поверхнева вода
subterranean sources – підземні джерела
subterranean water – підземна вода
successful method – успішний метод
surface drainage – поверхневий дренаж

surface runoff – поверхневий стік

surface water – поверхнева вода

that is - тобто

to a lesser extent - в меншій мірі

underground water – підземна вода

underlying rock – основна порода

uniform flow – рівномірний потік

upper surface – верхня поверхня

usable water – використовувана вода

water bearing clouds – водоносні хмари

water supply - водопостачання

water table – водний рівень

water vapour – водяна пара

wet periods – вологі періоди

6. Exercises for self-control:

1. Add suffixes to form words:

- | | |
|----------------|------------|
| 1. avail- | 1. -ly |
| 2. press- | 2. - age |
| 3. rapid- | 3. - ant |
| 4. drain- | 4. - ation |
| 5. import- | 5. - ic |
| 6. success- | 6. - er |
| 7. distill- | 7. - th |
| 8. atmosphere- | 8. - ful |
| 9. up- | 9. - ure |
| 10. deep- | 10. -able |

11. Add prefixes to form words:

- | | |
|-----------------|-----------|
| 1. - surface | 1. un- |
| 2. - fortunate | 2. under- |
| 3. - ground- | 3. re- |
| 4. - lying | 4. inter- |
| 5. - construct- | 5. dis- |

- | | |
|---------------|-----------|
| 6. – act | 6. over- |
| 7. – order | 7. sub- |
| 8. – possible | 8. under- |
| 9. – load | 9. im- |
| 10.-rich | 10.en- |

111. Find English equivalents:

- | | |
|---------------|-----------------|
| 1.свердловина | 1. dense |
| 2. струмок | 2. well |
| 3. насичення | 3. saturation |
| 4. початковий | 4 cloud |
| 5. хмара | 5. island |
| 6. острів | 6. initial |
| 7. опріснення | 7. stream |
| 8. питний | 8 content |
| 9. вміст | 9. distillation |
| 10. щільний | 10.. potable |

IV. Match definitions:

- | | |
|-------------------|--|
| 1. surface water | 1. the process of removing salt from sea water so that the water can be used |
| 2. ground water | 2. a rock that water can pass through |
| 3. permeable rock | 3. water that is available for people to use in a particular area |
| 4. upper surface | 4. the force that makes everything fall to the ground |
| 5. water table | 5. at the top of surface |
| 6. gravity | 6. the top layer of water |
| 7. water supply | 7. water that is underground |
| 8. desalination | 8. the level before the Earth's surface where water is found |
| 9. drainage | 9. a small narrow river |
| 10.sstream | 10.a system of pipes and passages that take away water or waste liquid from the area |

7. Read the text and carry out the following assignments: a)find the paragraph describing advantages of atmospheric water; b)find the

sentences telling about surface water; c) find the paragraph containing the main conclusions of the author.

Text A

Sources of Water

In practice , there are four general sources of water available to man: surface water, ground water, atmospheric water and oceans. The most important of these is surface water in the form of rivers, streams and lakes. Of the other three sources , ground water is increasing rapidly in importance, particularly in those areas which lack surface drainage.

Ground water or , as it is sometimes called, underground water occurs below the surface of the ground in a zone of saturation, that is, the zone in which permeable rocks are saturated with water under hydrostatic pressure .Water moves down from the surface by gravity to enter this zone, the upper surface of which is called the water-table or phreatic surface; for this reason, ground water is sometimes called phreatic, subsurface or subterranean water. The lower limit of the zone is the point at which the underlying rock formation becomes so dense that water cannot penetrate it. It may vary in depth from a few feet to hundreds of feet and there are isolated examples of porous rock having been found at depths of more than a mile. The zone of saturation is very important because it supplies all wells and maintains the normal , relatively uniform flow of streams. It acts as a gigantic reservoir which retains water during wet periods, causing a rise in the water-table. The chief uses of ground water are for irrigation and domestic purposes. Atmospheric water, or water vapour , has two major advantages over water contained in the oceans : it is found everywhere above the land surface, and it is free of salt. Unfortunately , no large-scale, successful economic method has yet been devised to tap this water-supply and direct it to places where it is most needed One serious initial obstacle lies in the fact that clouds are not necessarily water-bearing and may be dry If, however, they

contain appreciable amounts of water vapour this may either dry out or condense and fall as rain or snow.

The oceans remain by far the largest potential source of water and together with the island seas contain 92.7 per cent of the earth's water . This water could be made potable if its saline content were reduced from about 35.000 parts per million to 500 parts per million or less. We have known for a long time that it is possible to produce fresh water by heating salt water and so promoting distillation . Only recently , such processes have been developed on a large scale.

While it is likely that, the quantity of usable water will be increased by desalination and the creation of artificial precipitations, it is certain : that for some time to come the greater proportion of our water supply will be derived primarily from surface runoff and to a lesser extent from subterranean sources.

8. Answer the following questions on the text:

1. What is the most important source of water?
2. What is a zone of saturation?
3. What are the chief uses of ground water?
4. What is the largest potential source of water?
5. What is the saline content of the ocean water?

9. Express the main idea of the text in Ukrainian in the shortest possible way.

II. Structure and written comprehension

1. Write out of the text the sentences with verbs in passive voice forms and translate them into Ukrainian.

2. Translate into English using passive forms:

1. Ґрунтова вода називається також підземною водою.
2. Пориста порода була знайдена на глибинах більше милі.
3. Колодязі постачаються зоною насичення.

4. Атмосферна вода знаходиться в усіх місцях.
5. Більшість води вміщується в океанах.

3. Make up questions to have the following answers :

1. Ground water is increasing in importance in areas lacking surfacedrainage.
2. Water moves down from the surface by gravity.
3. The zone of saturation retains water during wet periods
4. Atmospheric water is found everywhere and is free of salt.
5. It is possible to produce fresh water by heating salt water and promoting distillation.

4. Find in the text sentences corresponding to Ukrainian ones:

1. Головні використання підземної води - для зрошення та побутових проблем.
2. Цю воду можна було б зробити питною, якби знизити вміст солі.

111. Listening comprehension

1. Expressions for the text comprehension:

- according to – згідно з
account for – охоплювати, включати
annual discharge – щорічне витікання
annual runoff – щорічний стік
annual satisfaction – щорічне задоволення
cubic kilometre – кубічний кілометр
earth's entrails – надра землі
fresh water – прісна вода
human requirements – потреби людей
little by little – мало помалу
natural distribution – природний розподіл
North America – Північна Америка
renewable resources – відновлювані ресурси
river watermark – річкова відмітка води
salt water - солонa вода
South America – Південна Америка
water discharge – витікання (скидання) води

water requirement – потреба в воді

water reserves – водні резерви

water resources - водні ресурси

2. Listen to the tape-recorded text below and be ready to choose the best answer for the following questions:

1. How much water do volcanoes eject annually?
2. What is the percentage of salt and fresh water?
3. How much fresh water is accessible to man?
4. On what continent is the greatest water discharge into the ocean?
5. When is the greatest runoff of rivers?

Text B

Water Famine .Reality or Illusion?

Scientists hold that water was born in the earth's entrails at the dawn of its life . Somewhere in its depths the birth of water continues to this day . Together with lava , volcanoes annually eject 40 million tons of water. Thus, little by little, the amount of water on the earth's surface increases.

Unfortunately, 97,5 per cent of all water reserves are claimed to be salt water. Consequently, fresh water resources account for only 2,5 per cent and the most accessible as little as 0,3 per cent. Moreover, the natural distribution is extremely uneven. The annual fresh water discharge into ocean is the greatest in Asia and South America ~31 and 25 per cent of the total amount respectively , North America accounts for 17, Africa 10, Europe 7, Antarctica 5 and Australia 4 per cent.

The river watermark is also uneven during the year. from May to October all rivers discharge 63 per cent of their annual runoff, leaving only 37 per cent for the rest of the year.

The annual satisfaction of human requirements runs to something like 2,600 cubic kilometers of water- about 6 per cent of the earth's annually renewable fresh water resources . According to experts, by the year 2000, considering the growth of population,

industry and agriculture the water requirement will reach 6,000 cubic kilometres or about 13 per cent

3. Render the text in English or in Ukrainian.

4. Do you know that:

-More than two million tons of vapour are annually emitted into the atmosphere

-If we loaded the raw materials which man extracts from the bowls of the earth each year we would have a goods train 670000 kilometres long. -Every urbanite throws away nearly a ton of unwanted things annually. -The Antarctic ice cap releases into the ocean at least 2,400 cubic kilometers of crystal-clear fresh water annually.

LESSON THREE

Grammar Герундій

Герундій - це неособова форма дієслова із закінченням **-ing** що, має властивості дієслова і іменника.

Дієслівні властивості герундія

А. Герундій перехідних дієслів вживається з прямим додатком

She began cooking food. Вона почала готувати їжу.

Б. Після герундія може стояти прислівник

They continued listening attentively. Вони продовжували уважно слухати.

В. Герундій має неозначену й перфектну форми, вживається в активному і пасивному стані

Active

Indefinite

writing

Passive

being written

Perfect having written having been written

Перфектна форма герундія виражає дію, що передує дії, вираженій дієсловом - присудком речення

Thank you for having helped me. Дякую за те, що допомогли мені.

Неозначена форма герундія вживається частіше всього для вираження дії, одночасної з дією, вираженою дієсловом-присудком речення.

He sat without turning his head. Він сидів, не обертаючись.

Герундій вживається в активному стані, якщо іменник або займенник, до якого він відноситься, означає суб'єкт дії, вираженої герундієм

Mary could not help laughing. Мері не могла не засміятися.

Герундій вживається в пасивному стані, якщо іменник або займенник, до якого він відноситься, позначає об'єкт вираженої ним дії.

But he has no right to come without being invited. Але він не має права прийти, якщо його не запросили

Іменникові властивості герундія

Герундій у реченні виконує такі властиві іменнику синтаксичні функції: а. підмета:

Smoking is harmful. Куріння шкідливе.

б. частиною присудка:

His hobby is collecting stamps. Його улюблене заняття - колекціонувати поштові марки

в. додатка прямого і прийменникового:

He likes talking to me. Він любить розмовляти зі мною.

She is fond of painting. Вона любить малювати.

Крім того, герундій має ще такі іменникові властивості:

а/перед герундієм може вживатися прийменник, що відноситься до нього:

Nobody thought of going to bed. Ніхто й не думав лягати спати

б/перед герундієм, як і перед іменником, може вживатися присвійний займенник або іменник у присвійному відмінку:

Would you mind my opening the window? Ви не заперечуєте, якщо я відчиню вікно? I insist on my sisters staying at home. Я наполягаю на тому щоб моя сестра залишилася удома.

Переклад герундія

На українську мову герундій перекладається:

а/ неозначеною формою дієслова /інфінітивом/:

I thought of coming to see you. Я думала провідати вас,

б/ іменником:

He liked riding, rowing and fencing. Він любив верхову їзду, веслування і фехтування,

в/дієприслівником:

And they continued their work without looking up. I вони продовжували працювати, не розгинаючись.

г/ присудком підрядного речення:

Excuse my leaving you. Пробачте, що я залишив вас.

Комплекси з герундієм

Сполучення іменника у присвійному чи загальному відмінку або присвійного займенника з герундієм становить герундіальний комплекс.

Герундіальний комплекс 'становить один складний член речення і в реченні може бути:

а/ підметом:

Your coming: here is very desirable. Ваш приїзд сюди дуже бажаний,

б/ додатком /безприменниковим і применниковим/ :

Forgive my saying it. Простіть, що я сказала це. I insist upon your staying. Я наполягаю на тому, щоб, ви залишились,

в/ означенням: .

I don't know the reason of your leaving Я не знаю причини

вашого від'їзду, г/обставиною:

I entered the room without his seeing it:

Я увійшов у кімнату так, що він і не побачив цього.

I. Vocabulary and reading comprehension

1. Read the following; international words and give their Ukrainian equivalents:

sphere, problem, surface reservoirs, important role, production, individual well, public water supply, complexity, fact, physico-chemical processes, transformation, economic and political problems, conflicts, private companies, federal government, separate states, steel corporation industrial companies, methods, association, chemical Industry, modernization, purifying technology, local authorities, system, discussion, in progress, utilization, energy crisis, reproduction.

2. Define meaning of the following words by word-building suffixes.

- 1) broad, broaden, broadened
- 2) pollute, pollution, pollutant, polluted, unpolluted
- 3) dispose, disposal, disposed
- 4) produce, production, productive, produced, reproduction
- 5) purify, purification, purifying, purified
- 6) transform, transformation, transformer, transformed
- 7) economy, economic, economist, economizer
- 8) private, privatize, privatization, privatized
- 9) protect, protection, protective, protected, unprotected
- 10) industry, industrial, industrialize
- 11) introduce, introduction, introductory, introduced
- 12) real, realistic, unrealistic, unreal
- 13) modern, modernize, modernization
- 14) build, builder, building, built
- 15) discuss, discussion, discussed
- 16) create, creative, creation, created, uncreative
- 17) complicate, complicated, complication, complicating

18) utilize, utilized, utilization

3. Memorize the following words necessary to comprehend the text:

appeal	-з'явитися
attempt	- спроба
base	-базувати
boring	-буріння, буровий, пробурений
broaden	-розширюватись
complexity	-складність
complicate	-ускладнювати
declare	-оголосити, заявити
disposal	-усунення
dump	-смітник
expect	-очікувати
expose to	- піддавати
facilities	-засоби, споруда
health	-здоров'я
impact on	- вплив на
influence on	- вплив на
matter	-речовина
measure	-захід
numerous	- численний.
overcome	- подолати
postponement	- відкладання
provide	- забезпечити
pollution	- забруднення
purify	- очищати
quite	- досить
reason	- причина, підстава
reproduction	- відтворення
require	- вимагати
scatter	- розкидати
sewage	- стічні води
threat	- загроза

4. Expressions for the text comprehension

all over the area – по всій території

arms race – гонка озброєнь

as well - також

back in 1973 – ще в 1973 р.

boring well - свердловина

bring about – призвести до викликати

certain reservoirs – певні водойми

chemical industry – хімічна промисловість

depend upon – залежати від

desperate struggle – відчайдушна боротьба

economic problems – економічні проблеми

energy crisis – енергетична криза

federal government - федеральний уряд

first of all – перш за все

food stuffs – продукти харчування

for instance - наприклад

former state – попередній стан

Great Lakes – Великі Озера

great variety – велике розмаїття

ground water – ґрунтова вода

important role – важлива роль

in the meantime – між іншим

individual wells – окремі свердловини

industrial companies - промислові компанії

irreversible changes – необоротні зміни

organic environment – органічне середовище

local authorities – місцева влада

meet targets – задовольняти цілі

necessary methods – необхідні методи

oil fields – родовища нафти

physico-chemical processes – фізико-хімічні процеси

political problems - політичні проблеми

polluted reservoirs – забруднені водойми
internal problems - внутрішні проблеми
polluted water – забруднена вода
pollution problem – проблема забруднення
private companies – приватні компанії
public supply – комунальне постачання
purifying facilities – очисні споруди
purifying plants – очисні споруди
purifying technology – технологія очищення
qualitative changes – кількісні зміни
recent years – недавні роки
second time purification – повторне очищення
second utilization – друге використання
at the expense – за рахунок
separate states – окремі стани
steel corporation – сталева корпорація
surface reservoirs – поверхневі водойми
take place - відбуватись
technical viewpoint – технічна точка зору
to be in progress - відбуватись
underground wells – підземні свердловини
various dumps – різні звалища
waste dumps - звалища сміття
waste matter – смітцева речовина
water pollution – забруднення води
water purification – очищення води
water resources – водні ресурси
water supply - водопостачання

5.Exercises for self-control:

1.Find Ukrainian equivalents:

1. surface reservoirs
2. play a role
3. take place

1. вплив дощових вод
2. грати роль
3. відведення стічних вод
4. використання води

- | | |
|--------------------------------------|--------------------------|
| 4. influence of rainwater харчування | 5. виробництво продуктів |
| 5. disposal of sewage | 6. складність питання |
| 6. use of water | 7. мати місце |
| 7. production of foodstuffs | 8. поверхневі водойми |
| 8. complexity of issue | 9. методи очищення |
| 9. authorities of states | 10. влада штатів |
| 10. methods of purifying | |

11 Find English equivalents:

- | | |
|---------------------------------|--------------------------------|
| 1. протягом кількох років | 1. as required by the law |
| 2. як це вимагає закон | 2. threat to health |
| 3. система вторинного очищення | 3. problem of reproduction |
| 4. загроза здоров'ю | 4. to overcome crisis |
| 5. проблема відтворення | 5. for several years |
| 6. подолати кризу | 6. a system of second-time |
| purification | |
| 7. використання стічних вод | 7. modernization of technology |
| 8. мала надія | 8. lives of towns and cities |
| 9. модернізація технології | 9. little hope |
| 10. життя малих та великих міст | 10. utilization of sewage |

111. Find Ukrainian equivalents paying attention to ways of translating gerund:

- | | |
|---------------------------------------|-----------------------------------|
| 1. the problem of solving | 1. планувати побудову системи |
| 2. impediments to solving the problem | 2. проблема вирішення |
| 3. methods of purifying sewage | 3. проблема забезпечення |
| 4. to plan building a system | 4. проекти приборкування річок |
| 5. the problem of providing | 5. методи попередження повіней |
| 6. far from being solved | 6. далеко від вирішення |
| 7. methods of treating raw water | 7. методи очищення стоків |
| 8. projects of taming rivers | 8. перешкоди вирішенню проблеми |
| 9. methods of pumping water | 9. методи обробки неочищеної води |
| 10. prospects of preventing floods | 10. методи перекачування води |

IV. Match definitions:

- | | |
|-----------------|---|
| 1. pollution | 1. a very deep narrow hole in the ground made in order to get water or oil |
| 2. reservoir | 2. the process of doing something again in the same way as before |
| 3. environment | 3. people in official organisations with legal power to make people obey laws or rules |
| 4. reproduction | 4. the process of getting rid of something |
| 5. boring well | 5. the process of damaging the air, water, or land |
| 6. disposal | 6. waste substances removed from houses or other buildings by a system of underground pipes |
| 7. impact | 7. the place in which people live and work |
| 8. authorities | 8. the process of making something clean by removing dirty or harmful substances from it |
| 9. purification | 9. an effect or influence |
| 10. sewage | 10. an artificial or natural lake where water is stored |

6. Read the text and carry out the following assignments:

- find the sentences describing the role of ground water in water supply;
- find paragraphs telling about the pollution of ground water;
- choose the best Ukrainian title expressing the main idea of the text.:

Text A

Water Pollution in the USA

The problem of solving pollution from the technical viewpoint turned out to be more difficult than expected.

First of all, it became evident that in certain reservoirs such great qualitative changes had taken place that it was practically very difficult to return them to their former state. Irreversible changes have taken place in the Great Lakes, because the disturbances in the organic environment of the Lakes are irremediable

The sphere of water pollution is broadening. During the recent years

there appeared a new problem - the pollution of ground water. The pollution of ground water is caused by a great variety of reasons: numerous waste dumps scattered all over the area and exposed to the influence of rainwater, polluted surface reservoirs, the disposal of sewage from factories (waste matter as well), and the use of water on oil-fields.

Water supply at the expense of ground water plays an important role in the lives of many towns and cities, and in the production of foodstuffs. The water supply of 12-15 million families depends upon individual underground boring wells, which have no purifying facilities. 71% of the public water supply is based upon ground. The complexity of the issue lies in the fact that the physico - chemical processes of the transformation of ground water are still not fully explored.

Internal economic and political problems are impediments to solving the pollution problem. For several years conflicts have been taking place between private companies, the federal government and the authorities of separate states. Back in 1973 the Bethlehem Steel Corporation, unwilling to spend about 100 million dollars on building purifying plants, undertook a desperate struggle against the laws protecting the environment of the state of Pennsylvania. By 1977 many industrial companies had not introduced the necessary methods of purifying sewage, and there is little hope that the targets planned by the law will be met. The Association of the Chemical Industry, for instance, has declared that it is unrealistic to expect the modernization of purifying technology, as required by the law.

Quite often local authorities do not plan building a system of second time purification. Discussions are in progress, while in the meantime polluted water runs into reservoirs creating a threat to the health of the people, and complicating the second utilization of sewage.

The arms race and the energy crisis have an impact on the problem of reproduction of water resources. Attempts to overcome the energy crisis have brought about the postponement of many water purification measures.

The problem of providing the country with water resources is still far from being solved

7. Answer the following questions on the text:

1. What is the pollution of ground waters caused by?
2. How many families of the USA depend upon individual underground boring wells?
3. Is public water supply based upon ground water?
4. What has the Association of the Chemical Industry in Pennsylvania declared?
5. What has an impact on the reproduction of water resources?

8. Express the main idea of the text in Ukrainian in the shortest possible way.

11. Structure and written expression.

1. Write out of the text sentences with gerunds, comment on their forms and functions and translate them into Ukrainian.

2. Translate into English using gerunds:

1. Розв'язання проблеми забруднення є важливим завданням.
2. Ця проблема вирішується побудуванням станцій контролю забруднення.
3. Вода використовується для охолодження в енергетиці.
4. Велику роль в забрудненні водних ресурсів грають стічні води великих та малих міст, сіл.

3. Find in the text sentences corresponding to Ukrainian ones:

1. Внутрішні економічні та політичні проблеми є перешкодою для вирішення проблеми забруднення. 2. Водопостачання за рахунок ґрунтових вод грає важливу роль.

III. Listening comprehension

1. Expressions for the text comprehension:

accumulated snow – накопичений сніг

advance of winter – прихід зими
average content – середній вміст
brief thaws – короткі відлиги
density of ice – щільність льоду
drainage basin – площа водозбору
eventual release – кінцеве вивільнення
fallen snow – полеглий сніг
formation of crust – утворення насту
heavy snow – важкий сніг
in the form of snow – у формі снігу
increasing depth – збільшена глибина
late winter – пізня зима
limited value – гранична величина
specific gravity – питома вага
old snow – старий сніг
reezing point – точка замерзання
regional temperature – регіональна температура
solid ice – твердий лід
sponge-like action – губкоподібна дія
temporary storage – тимчасове накопичення
natural storage – природне накопичення
weight of snow – вага снігу
water content – вміст води

2. Listen to the tape-recorded text below and be ready to choose the best answer for the following questions:

1. When is snow low in water content ?
2. When is snow high in water content?
3. What is the average water content of newly fallen snow?
4. What is the specific gravity of ice?

Text B

SNOW STORAGE

Precipitation in the form of snow, its storage as snow accumulates on the ground, and its eventual release as water are all related to temperature. Snow accumulates on the surface of the ground as long as precipitation continues while temperature» remain at or below the freezing point. It gradually consolidates with the advance of winter because of the increasing depth and weight of the accumulated snow and because of the formation of crusts of layers of ice by the freezing of water derived from brief thaws or from rain and held by the snow as a result of its sponge-like action. Water in the form of snow and ice is, therefore, temporarily stored on the surface of the ground, but such storage is dependent on regional temperatures and is beyond the control of man.

Snow varies greatly in its water content. It may be light, or low in water content, if the temperature is considerably below freezing when the snow falls; or it may be heavy, or high in water content, if the temperature is near the freezing point when the snowfall occurs. The average water content of newly fallen snow is about 0,10 in.; that is. 1 inch of water is equivalent to 10 inches of snow .However, in heavy snow or old snow the water content is considerably higher, and in late winter, when the accumulated snow and ice approaches the density of solid ice, the ratio of water to depth of snow is still higher. The limiting value, of course, is 0.92 ,the specific gravity of ice. When such heavy snow has a depth of several feet, it holds a great amount of water in temporary natural storage, the equivalent of 12 inches or more of water over part or all of a drainage basin being not uncommon.

2.Render the text either in English or in Ukrainian.

3.Do you know that...

-Only about 54 of the world's 164 countries have safe water and most of them

are in North America and Europe.

-Among countries on the safe list: Kuwait, Liechtenstein, New Zealand and

South Africa.

- Tips for vacationers in countries with unsafe water:

-Drink bottled water; boil water; use iodine tablets or drops for

- Avoid using ice and brushing teeth with tap water.
- Avoid fresh vegetables, fruits washed in unclean water.

TEST

1. Insert necessary words or expressions:

1. Economic and political issues are impediments to ... the pollution problems. 2. The problem of ... the country with water resources is not easily solved. 3. Local authorities do not plan ... a sustem of purification facilities. 4. Avoid ... teeth with tap water. 5. It is possible to produce fresh water by ... salt water. 6. Ground water occurs in the zone of ... 7. Water moves down from the surface by ... 8. Ground water is increasing rapidly in ... 9. Atmospheric water has ... over ocean water. 10. The river ... is uneven during the year.

11. Indicate Ukrainian equivalents:

1. water vapour
2. to a lesser extent
3. potable water
4. annual runoff
5. uneven distribution
6. qualitative changes
7. water pollution
8. boring wells
9. freezing point
10. water content

111. Indicate English equivalents:

1. твердий лід
2. коротка видлига
3. загроза здоров'ю
4. приватна компанія
5. поверхневі водойми
6. прісна вода
7. пориста порода
8. гідростатичний тиск

9. на практиці

10. згідно з

IV. Answer questions:

1. Do oceans affect weather?
2. What is the largest ocean in the world?
3. What is desalination?
4. What is the largest potential source of what?
5. What is the largest fresh water lake in the world?
6. What is the pollution of ground water caused by?
7. When is snow high in water content?
8. When is ice formed?
9. What is water freezing point?
10. Where is Pennsylvania situated?

Lesson Four

1. Vocabulary and reading comprehension

1. Read the following international words and give their Ukrainian equivalents:

main factors, pollution control stations, visit, engineers, mechanical end biological methods, gases, chlorine, heating systems, impreesion, dominate, mazut, modern quarters, department, effective method, in nature, start, international.

2. Memorize the following words necessary to comprehend the text:

acuteness- гострота

admixture- домішка

air- провітрювати

channel- пускати по каналу

cheerfully- бадьоро

chlorine- хлор

cleanse- чистити, очищати

coal- вугілля

destroy- руйнувати

district – район

effluent - стік , втік

enter- поступати

exhaust- вихлоп, вихлопний

fine- тонкий, витончений

fume- дим

further- наступний

generate - виробляти

heating- опалення

heavily- дуже

heavy- сильний

hilltop- верх горба

however- проте

installations- споруда

linger over- затримуватися, затягуватися

main- головний

pipe – передавати по трубах

poison- отруювати

process- обробляти

quarter- квартал

rather- швидше, охочіше

release- випускати

several - декілька

sewer- колектор, стічна труба

slow- повільний

steam - пара

suburb- передмістя

the...the... чим... тим

traffic- вуличний рух

treat- обробляти

undergo - зазнавати

whence- звідки

3. Expressions for the text comprehension:

air pollution – забруднення повітря

all round the city – повсьому місту
as regards – що стосується
district heating – районне опалення
effective method – ефективний метод
finer purification- більш тонке очищення
as for - щодо
for example - наприклад
heat-and-power plant - теплоелектроцентрально
industrial effluents – промислові стоки
main factors – головні фактори
near future – найближче майбутнє
exhaust fumes – вихлопні гази
of course – звичайно
one can – можна
Paris suburb – передмістя Парижа
polluted area – забруднена територія
pollution control station – станція контролю забруднення
processed water – оброблювана вода
sewer waters – стічні води
water supply system- система водопостачання
poisoned air- отруєне повітря
west end – західний кінець
west winds – західні вітри
4.Exercises for self-control:

1 Find Ukrainian equivalents:

- | | |
|-------------------------|-------------------------|
| 1. air pollution | 1. контроль забруднення |
| 2. industrial effluents | 2. забруднення повітря |
| 3. pollution control | 3. біологічні методи |
| 4. processed water | 4. піддати очищенню |
| 5. biological methods | 5. промислові стоки |
| 6. undergo purification | 6. щодо, що стосується |
| 7. west wind | 7. західний вітер |
| 8. as regards | 8. звичайно |

9. heat-and-power plant

9. оброблена вода

10. of course

10. теплоелектроцентрально

11. Find English equivalents:

1. головний фактор

1. sewer waters

2. стічні води

2. water supply

3. передмістя Парижа

3. heating system

4. очищена вода

4. poisoned air

5. водопостачання

5. modern quarters

6. система опалювання

6. near future

7. отруйне повітря

7. main factor

8. сучасні квартали

8. purified water

9. найближче майбутнє

9. exhaust fumes

10. вихлопні гази

10. Paris suburb

11.1. Match definitions:

1. industrial effluents 1. liquid waste such as waste from a factory

2. sewer and fog 2. polluted air that is a mixture of smoke

3. suburb 3. an underground pipe or passage that carries liquid waste

4. installation in 4. rooms or buildings for people to live in

5. admixture 5. to purify

6. smog 6. to make air, water, or liquid too dirty and dangerous for people to use in a safe way

7. quarters 7. the vehicles that are travelling in an area at a particular time

8. traffic 8. a substance consisting of different substances that combine

9. pollute 9. a system or piece of equipment

10. cleanse 10. an area or town near a large city but away from its centre

5. Read the text and carry out the following assignments:

- a) find the paragraph describing water purification;
- b) find the sentences telling about traffic problems;
- c) give the text the best Ukrainian title.

Text A

Water and air pollution

Water and air pollution are the two main factors that destroy the environment in big cities. Paris has no industry, so the Soine is not polluted by industrial effluents but by sewer waters. However, this problem is being solved by building pollution control stations in a Paris suburb. The sewage is channeled into them and cleansed before it goes into the Seine.

When visiting these installations, one can often see how pure the processed water is - the engineers who work there drink it quite cheerfully.

Water is purified by mechanical and biological methods, cleansed of admixtures and gases. The purified water is treated with chlorine and released into the rivers, whence it enters the water supply systems where it undergoes further, and finer, purification.

Air is polluted mainly by heating systems and cars. When you look at Los Angeles from a hilltop you get the impression of vapour lingering over the city. Fortunately, west winds dominate in Paris and they air the city. However, when there is no wind they have smog, as regards heating, they have started to use more mazut rather than coal. The most poisoned air is in the most modern quarters. For example the 16th Department which is in the west end of the city and is aired by the west wind is a heavily polluted area.

District heating is an effective method. Several heat- and- power plants generate steam which is piped underground all round the city.

As for cars you know, of course, how heavy the traffic is in cities. The slower the traffic, the more exhaust fumes are.

This problem will not be solved in the near future.

The acuteness of the problem depends on how well the country is developed and on the number of cars. Many of these problems are international in nature.

6. Answer the following questions on the text:

1. What is the Seine polluted by?
2. Where are pollution control stations in Paris?
3. What is water cleansed of?
4. What is water treated with?
5. What is air polluted by?
6. What winds dominate in Paris?
7. When are there more exhaust fumes?

7. Suggest subtitles for some paragraphs of the text.

II. Structure and written expression

1. Write out of the text sentences with passive voice and translate them into Ukrainian

2. Write out of the text sentences with gerunds and translate them into Ukrainian.

3. Find in the text sentences corresponding to Ukrainian ones:

1. Ця проблема вирішується побудовою станцій контролю за забрудненням. 2. Можна побачити, якою чистою є оброблена вода.

III. Listening comprehension

1. Expressions for the text comprehension:

ancient Egypt - стародавній Єгипет

ancient Greece – стародавня Греція

ancient Rome – стародавній Рим

by means of – за допомогою
chain bucket elevator – цепний ковшовий підйомник
copper pipes – мідні труби
in order to – для того, щоб
our era – наша ера
primitive system - примітивна система
Renaissance period – період Ренесансу
reservoir water – вода водойми
self-running canal – самотічний канал
spanned valley – перекрита долина
special bridge – спеціальний міст
to a high level - на високий рівень

2.. Listen to the tape-recorded text below and be ready to choose best answer for the following questions:

1. How was water extracted from wells in ancient Egypt?
2. How was water extracted in ancient China?
- 3 How was water extracted in Babylon?
4. What pipes were used in Babylon?
5. How was water transported in ancient Rome?
6. When were first water-supply systems built in Europe?

Text B

First water-supply systems

The first primitive water-supply system was built nearly 5000, years before our era. In Ancient Egypt wells were dug and water was extracted from them by means of devices similar to “starks”. In Ancient China water was extracted from wells by means of winches and pulleys. In Babylon water was extracted and raised to a high level by means of pulleys and chain bucket elevators. Earthenware, wooden, lead and copper pipes were used to distribute reservoir water.

During the Renaissance period in Ancient Greece and in Ancient Rome whole water supply systems were created. In order to transport water self-running canals were built, which spanned valleys and gullies in the form of special bridges called aqueducts.

The first water supply systems in Europe (Paris, London) were built in the 12th and 13th centuries

3 Render' the text either in English or in Ukrainian.

4. Do you know that:

- Nearly seven million hectares of forest in Europe were damaged by air pollution, a Swedish expert said.

- Prognoses indicate that more than 10.000 cubic kilometers of water are to be drained annually for human use in the very near future.

- In centres of industry iron rusts 20 times faster than in rural areas

- Aluminium corrodes 100 times faster in the city than in rural areas.

LESSON FIVE

Терміни і термінологія

Термін - це слово або словосполучення з історично умотивованим чи умовно закріпленим значенням, що відбиває одне поняття у спеціалізованій галузі знання чи виробництва.

Вимоги до терміна такі:

1. Термін має бути по можливості коротким і точним. Вдалий термін повинен чітко і повністю подавати характеристики поняття. наприклад: nut "гайка", piston "поршень", слово table, вживане як термін, може означати "таблиця", "схема", "станок", "планшайба", „рівень”.

2. Специфічність - це ознака, дуже бажана якість для технічного терміна у кожній галузі науки. В ідеалі термінологічне найменування повинне бути однозначним у межах окремої галузевої термінології і не мати синонімів.

Від терміна також вимагають, щоб він не мав емоційно-експресивного забарвлення, був цілеспрямованим на об'єкт у

системі або ряді, відповідав словотворчим закономірностям мови. Разом від терміна вимагається, щоб він служив ґрунтом для утворення деривативів.

Серед термінів слід розрізняти:

1. Терміни прості, що збігаються з основами слів: nut "гайка", plant "установка", well "свердловина".

2. Терміни-складні слова:

Spillway "водозлив", windbreak "вітрозахисний" greenhouse "теплиця", low-waste "маловідходний".

3. Терміни-похідні слова /деривативи/:

afterpurification "доочищення", coagulant "коагулянт", deaeration "діаерація", reuse "повторне використання", inorganic "неорганічний".

4. Терміни-словосполучення:

wastes treatment "очищення стічних вод", aeration station "станція аерації", accidental pollution "аварійне забруднення", domestic refuse "побутові відходи".

Іноколи ці терміни можуть включати в свій склад три, чотири і більше слів:

biological oxygen demand ^біологічна потреба в кисні", air monitoring station "станція моніторингу якості повітря", air pollution control equipment "обладнання для боротьби з забрудненням повітря", automatic water quality control system "автоматизована система контролю якості води", air washing of filter "продування фільтру".

5. Терміни-скорочення:

EQI=environmental quality index "шкала якості оточуючого середовища,

COD=chemical oxygen demand "хімічна потреба в кисні", DO=dissolved oxygen "розчинений кисень". Багато термінів утворені з використанням грецьких та латинських коренів і становлять так звані інтернаціоналізми, спільні для багатьох європейських мов:

absorption "абсорбція", artesian "артезіанський",

biogeocenosis "біогеоценоз" canalization "каналізація", reservoir "резервуар". При їх перекладі словник майже не потрібен.

Проте, є деякі частини термінів, які умовно казивають "удаваними друзями перекладача": reclamation „меліорація", fabric "тканина", mercury "ртуть", solid "тверда речовина" і інші, що становлять певні труднощі при перекладі.

Примітка:

Переклад багатокomпонентних термінів-словосполучень краще всього починати з кінця: air exchange "обмін повітря", air quality criterion "критерій якості повітря", хоча можливі, а деяких випадках, варіанти: aeration tank "аераційний басейн", „басейн для аерації”.

1. Vocabulary and reading comprehension.

1. Read the following international words and give their Ukrainian equivalents: filtration system, coagulation, basic, principle, chemicals, line, filtering action, hydraulic diaphragm, cycle, optimize, automatically, mixture.

2. Define meanings of the following words by their affixes:

- 1) continue- continuation- continuous- continued, discontinue;
- 2) filter- filtered- filtration- filtering; 3) dose- dosed- dosage 4) add- added- addition; 5) direct- indirect- directly- indirectly, direction; 6) treat- treated- untreated- treatment; 7) contain- contained- container; 8) locate- located- location; 9) hydraulic- hydraulics; 10) cut- cutter- cutting; 11) relax- relaxing- relaxed- relaxation; 12) frequent- frequency; 13) cycle- cyclic- cycling- recycle; 14) optimize- optimized- optimization- optimal;
- 15) control- controlled- controller- uncontrolled; 16) mix- mixed- mixing- mixture; 17) remove- removed- removal- removing; 18) accomplish- accomplished- accomplishment;
- 19) interrupt- interrupted- non-interrupted- interruption; 20) wash- washed- washing, backwashing; 21) settle- settled- settling- settlement, settler

3. Memorize the following words necessary to comprehend the text

accomplish- здійснювати

add- додавати

allow- дозволяти

backwashing- зворотна промивка фільтра

basic- основний

bed- шар, загрузка

contain – містити,вміщати

contain- містити,вміщати

continuous- безперервний

conventional- звичайний,традиційний

countercurrent- протипотічний

desire- бажати

dewater- обезводнювати

overflow – переповнений

direct- безпосередній,прямий

drive – проганяти

effluent- той,що витікає

face- поверхня

filter bed- фільтруючий шар

final- кінцевий

follow- іти за, йти слідом

frequency- частота

hopper- бункер

include- включати

interrupt- переривати

influent - той, що втікає

intermittent- той,що перерізається

involved- зв'язаний з цим

level- рівень

line- трубопровід

locate- розташовувати

mixture- суміш

opposite - протилежний

opposite- протилежний action дія

quality- якість

recycle- відправити на повторну переробку
relax- слабшати,ослаблятися
remove- усувати
return- повертати
settler- відстійник
shell – оболонка
shell- оболонка
side- бік
sludge- мул
solids-з важений шар осаду,тверді речовини
push- штовхати
space- місце
supertant – той, що спливає
thus- таким чином
transfer- переміщати
tubular – трубчатий
tubular- трубчатий
vacate- звільняти
washing column- промивна колонка
while – в той час як
while- в той час як

4. Expressions for the text comprehension:

as well - також
basic principle – основний принцип
by means of – за допомогою
chemical coagulation – хімічна коагуляція
chemical precipitation – хімічне осаджування
clean sand – чистий пісок
continuous filtration – безперервна фільтрація
countercurrent filtration – протипоточна фільтрація
continuous washing – безперервна промивка
conventional practice – звичайна практика
cutting cycle – цикл очищення
discharge screen – вихідний сітчастий фільтр
effluent quality – якість стоку
face cutter – нід для очищення поверхні

filter bed – шар, що фільтрує
filter medium – матеріал, що фільтрує
filtered effluent – стік, що фільтрується
filtering face – фільтрувальна поверхня
filtration process – фільтраційний процес
filtration system – система фільтрації
final washing – кінцева промивка
flow out - витікати
flow rate – швидкість потоку
filtered water – фільтрована вода
filtering action – дія фільтрації
head tank – головний резервуар
hopper bottom – конічне дно
hydraulic diaphragm – гідравлічна діафрагма
influent wastewater – стічна вода, що вливається
intermittent washing – переривиста промивка
mechanical cutter – механічний ніж
opposite direction – протилежний напрямок
relaxing diaphragm – розслаблена діафрагма
sand bed – піщаний шар
sand push – поштовх піску
settler overflow – переповнення відстійника
settling tank - відстійник
sludge sand mixture – суміш мулу та піску
tubular shell – трубчата оболонка
wash water – промивна вода
washing column – промивна колонка
wastewater line – трубопровід стічної води

5. Вправи для самоконтролю:

1..Fill in verbs in passive voice forms using words in brackets:

1. Chemical precipitation ... by filtration (follow).
2. In continuous filtration ... a moving sand bed (involve).
3. A tubular shell ... a bed (call).
4. Discharge screens ... on the side of the bed (locate).
5. The sand and solids ... of the water (filter out).

6. The space ... by the relaxing diaphragm (vacate).
7. The mixture ... mechanically (remove).
8. The filtration process ... (not interrupt).
9. Flow rate ... (optimize).
10. The bed ... forward (push)

11. Find Ukrainian equivalents:

- | | |
|----------------------|------------------------------|
| 1. filtration system | 1. вихідний сітчастий фільтр |
| 2. sand bed | 2. швидкість потоку |
| 3. head tank | 3. система фільтрації |
| 4. discharge screen | 4. якість стоку |
| 5. flow rate | 5. трубчаста оболонка |
| 6. effluent quality | 6. промивна колонка |
| 7. tubular shell | 7. чистий пісок |
| 8. washing column | 8. основний принцип |
| 9. basic principle | 9. головний резервуар |
| 10. clean bed | 10. піщаний шар |

111. Find English equivalents:

- | | |
|------------------------------|------------------------------|
| 1. шар, що фільтрує | 1. face cutter |
| 2. трубопровід стічної води | 2. filter bed |
| 3. матеріал, що фільтрує | 3. continuous filtration |
| 4. ніж для очищення поверхні | 4. opposite direction |
| 5. безперервна фільтрація | 5. intermittent washing |
| 6. хімічна коагуляція | 6. countercurrent filtration |
| 7. протилежний напрямок | 7. filter medium |
| 8. перервна промивка | 8. chemical coagulation |
| 9. відстійник | 9. wastewater line |
| 10. протипоточна фільтрація | 10. settler |

IV. Match definitions:

- | | |
|------------------|---|
| 1. filtration | 1. a substance that is not a liquid or gas |
| 2. precipitation | 2. without stopping or being interrupted |
| 3. dosage | 3. to take something away from a place |
| 4. solid | 4. filter |
| 5. recycle | 5. the process by which a solid substance separates |

or is separated from a liquid

- | | |
|-----------------------|--|
| 6. continuous | 6. to treat waste materials so that they can be used again |
| 7. remove at one time | 7. the amount of a medicine or drug that you take |
| 8. bed | 8. the process of coming out into water or the air |
| 9. discharge | 9. thick soft mud |
| 10. sludge | 10. the process of removing something from a substance by passing through a filter |

6. Read the text and carry out the following assignments :

- find the paragraph describing the use of chemicals for the waste treatment;
- find the sentences telling about the filtering action .

Text A

The Continuous Countercurrent Filtration System

The continuous countercurrent filtration system includes chemical precipitation and coagulation directly followed by filtration through a filter bed. The basic principle involved is continuous countereurrent filtration through a moving sand bed.

Chemicals are added directly to the influent wastewater line. Precipitation and coagulation occur in the head tank. The dosage of chemicals can be varied depending on the nature of the waste to be treated and the quality of effluent desired.

The filter medium ,which could be other than sand , is contained in a tubular shell (called a bed) and is driven in one direction while the wastewater being treated passes through the filter bed in the opposite direction .The filtering action occurs through the depth of the bed as well as at its face .Filtered water flows out of the bed through discharge soreens located on the side of the bed. The sand and solids filtered out of the water are pushed by a hydraulic diaphragm toward the head tank countereurrent to the flow of water. The solids are removed from the face of the filter bed by a mechanical face cutter. After the diaphragm pushes the bed forward, it relaxes, thus allowing clean sand to fall into the space

vacated by the relaxing diaphragm. The frequency with which the sand push-face cutting cycle occurs is varied to optimize flow rate and effluent quality and is controlled automatically by the level in the head tank.

The sludge-sand mixture mechanically removed from the filtering face falls down into the hopper bottom of the head tank. This mixture is transferred to a washing column for cleaning. The clean sand is then returned by gravity to the hopper. The removal and washing of the sand may be intermittent or continuous. Final washing of the sand may be intermittent or continuous. Final washing of the sand is accomplished by means of filtered effluent. Because the sand is removed, cleaned, and then returned to the system, the filtration process is not interrupted for backwashing as it is in conventional practice. The waste wash water flows into a settling tank where the sludge is concentrated before dewatering. The settler overflow, or supernatant, is recycled to the influent line of the filtration process.

7. Answer the following questions on the text:

1. What does the continuous countercurrent filtration system include?
2. Where do precipitation and coagulation occur?
3. What does the dosage of chemicals depend upon?
4. Where is the filter medium contained?
5. Where are discharge screens located?
6. How are solids removed from the face of the filter?
7. How is frequency of the cycle controlled?
8. How is the clean sand returned to the hopper?
9. Where is the sludge concentrated before dewatering?

8. Express the main idea of the text in Ukrainian in the shortest possible way.

II. Structure and written expression.

1. Write out the text sentences with verbs in passive voice and translate them into Ukrainian.

2. Translate in to English using verbs in passive voice:

1.Річка Сена не забруднюється стічними водами. 2.Повітря в великих містах забруднюється автомобілями. 3.Вода очищується механічними та біологічними методами. 4.Більша частина водопостачання базується на ґрунтовій воді. 5.Вода збирається в резервуарах. 6.Перші системи водопостачання в Європі були побудовані в 12 столітті.

111. Listening Comprehension

1. Expressions for the text comprehension:

bluish hue – голубуватий відтінок

boggy area – болотиста площа

call for – вимагати, потребувати

drinking water – питна вода

extra purification – додаткове очищення

turn on - включати

go into operation – ввійти в дію

ozone station – озонова станція

peculiar taste – особливий смак

per capita - на душу населення

sterilized water – стерілізована вода

unpleasant smell – неприємний запах

water needs – потреби в воді

water purifier – очищувач води

yellowish water – жовтувата вода

3. Listen to the tape-recorded text below and to choose the best answer for the following questions:

1. What is per-capita-per-day capacity of drinking water in Moscow?
2. What is Moscow population now?
3. What rivers satisfy Moscow's water needs?
4. Why is there the need for extra purification of the Volga water?
5. What is the function of ozonizing?

Text B

Moscow Drinking Water

Today Moscow has a 190-gallon-per-capita-per-day capacity of drinking water. In the years that Moscow has been the Soviet capital, its population has grown from 1.6 million to over 8 million. This called for adding water resources to those furnished by the Moskva River which does not fully satisfy the capital's water needs.

The Volga River gives Moscow a yellowish water with a peculiar taste and smell, because it flows through a boggy and marsh area. Hence the need for extra purification.

A series of experiments led to a decision to ozonize the capital's drinking water. Specialists found ozone not only to be a powerful water purifier, but one that destroys all coloration, leaving the water a pleasant bluish hue, while also removing any and all unpleasant tastes or smells.

The new ozone station has just gone into operation here, and now, each time a Moscovite turns on the faucet, he gets ozonated-that's purified and sterilized drinking water.

3.Render the text either in English or in Ukrainian.

4.Do you know that:

- Every year world industry pollutes the atmosphere with about 1000 million tons of dust and other impurities.
- We annually cover with oil film up to 120 million square km. of Earth surface.
- Forests are disappearing. The conveniences of each person cost nature 300 trees.
-

TEST

1.Insert the missing words:

1. Ozone is a powerful water ... 2. Precipitation and coagulation occur in the ,, 3. The dosage of ... depends on the nature of the waste. 4. In the settling tank the sludge ... 5. The mixture is transferred to a

washing column for ... 6. Water and air pollution destroy ... in big cities.
7. Air is polluted by heating systems and ... 8. Water is purified by ...
methods. 9. In Babylon water ... by means of pulleys. 10. To transport
water ... canals were built in ancient Rome.

11. Indicate English equivalents:

1. промислові стічні води
2. очищена вода
3. вуличний рух
4. стародавній Єгипет
5. мідні труби
6. фільтраційна система
7. відстійник
8. питна вода
9. потреби в воді
10. безперервний процес

111. Indicate Ukrainian equivalents:

1. extra purification
2. water resources
3. effluent quality
4. countercurrent filtration
5. opposite direction
6. reservoir water
7. poisoned air
8. Paris suburb
9. heating system
10. 10. In order to

1V. Answer the following questions:

1. Why must natural water be treated before consumption? 2. How
are bacteria eliminated from water? 3. Why do large cities suffer more
from water pollution? 4. Was there water supply in Babylon? 5. Why
must sewage undergo secondary treatment? 6. Why is a treatment plant

necessary in a water supply system? 7. What is air polluted by? 8. How was water transported in ancient Rome? 9. What is the function of ozoning? 10. Where is the sludge concentrated?

Oral Topics

Laboratory work “ National University of Water Management and Nature Resources Use”

1. Use of Vocabulary

1.learn the following words and word combinations:

abroad – за кордоном

access - доступ

acquire the status – набути статус

associate professor – доцент

attend – відвідувати

be available – бути доступним

be engaged in – займатися, бути зайнятим

be accompanied by – супроводжуватись

choir - хор

come into existence – виникати

complete a course – завершити (закінчити) курс

consider – вважати, розглядати

correspondence department – заочне відділення

day-time department – денне (стаціонарне) відділення

enjoy reputation – мати репутацію

enrol – на(за)раховувати

gain a degree – отримати ступінь

graduate – випускник

grant the status – надати статус

hall of residence – гуртожиток

last – тривати

lecture hall – лекційна аудиторія

modular system – модульна система

maturity – зрілість

offer – пропонувати

patent – запатентувати

postgraduate – аспірант
 prestigious - престижний
 profound – глибокий
 recreation - відпочинок
 requisite - відповідний
 research workers – наукові співробітники
 run from ... till ... – тривати з ... до ...
 skilled specialist – кваліфікований спеціаліст
 staff – штат, персонал
 take exams – скласти екзамени
 to be highly rated – мати високий рейтинг
 to graduate from - закінчити
 train – готувати
 tuition fee – плата за навчання
 undergraduate – студент старших курсів
 yearly project – курсова робота

2. Read the names of faculties and specialities. Give Ukrainian equivalents.

Hydrotechnical engineering; hydroamelioration; mechanical engineering; faculty of economics; faculty of management; automobile engineering; hoisting, transport, building, road-making, land reclamation machines and mechanisms; heat power engineering; accounting and audit; applied mathematics; aerodrome and highway engineerig; heat and gas supply and ventilation, land management and cadastre, geoinformatics, water supply and water disposal

3. Match definitions:

- | | |
|-------------|--|
| 1. attend | 1. the state of being mature |
| 2. campus | 2. systematic investigation in the field of knowledge |
| 3. degree | 3. a lecture room with seats in rows rising one behind another |
| 4. graduate | 4. get pleasure from |
| 5. research | 5. a hostel provided by the university |
| 6. defend | 6. to be present |
| 7. train | 7. to present or provide with |
| 8. offer | 8. an area of land containing all the main buildings of a |

9. lecture hall 9. a person who has completed a course of study at a university or college and has received a degree or diploma

10. hall of residence 10. recognition of academic achievements

11. enjoy 11. to protect, speak or write in support of

12. maturity 12. to teach a skill

4. Say what faculties train the following experts:

Mechanical engineer, air-conditioning engineer, automatic control engineer, civil engineer, environmental engineer, gas engineer, heating and ventilation engineer, hydraulic engineer, reclamation engineer, economist, accountant, auditor, manager, programmer

Start with: ... engineer is trained at ... faculty.

5. Form new words from the stem of the following ones:

exist, high, learn, organize, lead, science, work, skill, manage, engineer, build, plan, equip, chemistry, transport, practice, convenient, picture, shop, mature

6. Join the following nouns with the adjectives to make word combinations:

school	day-time
institute	correspondence
academy	yearly
centre	advanced
economy	foreign
specialist	future
reputation	modular
student	engineering
faculty	technical
system	hydroameliorative
degree	leading
people	scientific
career	technological
department	research

year	national/international
training	skilled
project	picturesque
language	shopping
work	institution
hill	young
institution	academic

11. Reading Comprehension

1. Listen to the recording of the text and answer the questions :

NATIONAL UNIVERSITY OF WATER MANAGEMENT AND NATURE RESOURCES USE

National University of Water Management and Nature Resources Use (NUWMNRU) came into existence over 80 years ago in 1922 in Kyiv as a hydroameliorative technical school. Eight years later it became a school of higher learning known as Kyiv hydroameliorative institute. In 1959 it was transferred to the town of Rivne and was granted the status of All-republican institute. In December 1995 the institute was reorganized into State Academy. In 1998 following the recommendation of an accreditation commission of the Ukrainian Ministry of Education and Science and the decree of the Cabinet of Ministers Ukrainian State Academy of Water Management acquired the status of a university with the title of Rivne State Technical University. In 2002 RSTU got the name of Ukrainian state university of water management and nature resources use and in 2004 it was granted the status of National University of Water Management and Nature Resources Use.

NUWMNRU has become one of the leading educational and scientific centres of Ukraine. It trains engineers and research workers for different branches of national economy. It is considered to be Alma Mater for over 40,000 specialists who work in Ukraine and abroad. The university enjoys national and international reputation for its contribution into scientific research and training of skilled specialists.

NUWMNRU currently enrolls more than 11000 day-time and

correspondence students. They study at 9 faculties: Hydrotechnical engineering, Hydroamelioration, Mechanical engineering, Ecology, Land management and geoinformatics, Civil engineering and architecture, Economics, Management, Applied mathematics.

A modular system of academic programmes has been introduced following the example of world leading technological universities. These programmes lead to degrees of bachelor and master . It takes four years to complete a bachelor course and five years for a master degree course. Young people from Ukraine and other countries may specialize in such areas: hydrotechnical engineering; hydroamelioration; automobile engineering; hoisting, transport, road-building and land reclamation machines and mechanisms; mining engineering; equipment for chemical and building enterprises; heat and power engineering; organization of transportation and transport management; management of labour resources; ecology; water bioresources and aquaculture; agrochemistry and soil science; civil and industrial engineering; technology of production of building constructions and elements; aerodromes and highway engineering; architecture of structures; town planning and development; land management and cadastre; geoinformatics; heat and gas supply and ventilation; water supply and water disposal; automated control of technological processes; applied mathematica and computer integrated systems.

Most faculties have day-time and correspondence departments. The term of studies lasts from 4 to 5 years.

The academic year runs from September till June and is divided into two terms: autumn and spring ones with two vacation periods. The study of theory is accompanied by practical training. At the end of the term students take exams, credit tests and present yearly projects. At the end of the training course they defend diploma projects, advanced students may defend diplomas in a foreign language.

Today, NUWMNRU has a teaching and research staff of over 700 professors, associate professors, senior and junior lecturers who offer manysided and profound knowledge to their students. They are also engaged in research work. Alot of their inventions have been patented and introduced into production not only in

Ukraine but also abroad.

The university provides teaching, research and recreation facilities for students, postgraduates, teachers and other staff. There are spacious lecture halls, laboratories, study rooms with up-to-day equipment, computer centres, etc.

The university campus is conveniently situated on two picturesque hills in the outskirts of Rivne. The location has the advantage of easy access to the railway and bus stations as well as to shopping centres, banks and cafes. The campus includes seven academic buildings, eight halls of residence where accommodation is given to those who come from other towns and villages. The stadium and other sport facilities help students to enjoy the benefits of a regular exercise. Full medical service is available in a health centre.

The university offers an enormous range of art activities in the university choir, music and dance ensembles, etc.

Our university, one of the most prestigious higher educational institutions in Ukraine, is highly rated by young people. Now it faces the test of its maturity as an institution of European and world standing.

Answer the following questions on the university:

1. When did the university come into existence? 2. When was it transferred to the town of Rivne? 3. What status did the Academy acquire in 1998? 4. What specialists does the university train? 5. Why does the university enjoy the national reputation? 6. How many students study here? 7. How many faculties are there at the university? 8. What degrees does the university offer? 9. When does the academic year begin and finish? 10. Where is the campus situated? 11. What is the teaching and research staff of the university?

2. Read the text about National University of Water Management and Nature Resources Use and say whether the following statements are true or false:

1. The university is 70 years old. 2. It came into existence in Rivne. 3. It acquired the status of a university in 1998. 4. The university trains engineers and researchers. 5. The university currently enrolls more than 25,000 students. 6. There are eight faculties at the university. 7. The university graduates can gain the degree of a bachelor and master. 8. They can specialize in 32 areas. 9. At the end of every academic year students defend their diploma projects. 10. The university provides the requisite teaching, research and recreation facilities. 11. The campus is situated in the centre of the town. 12. The university is highly rated by young people.

3. Look through the text again and complete the following sentences by selecting the most appropriate statement :

1. NUWMNRU was founded in -----

- a) 1992
- b) 1959
- c) 2004

2. It is considered to be Alma Mater for almost ---- specialists.

- a) 50.000
- b) 30000
- c) c) 40000

3. The university has -----departments.

- a) day-time
- b) evening
- c) day-time and correspondence

4. There are ---- faculties at the university.

- a) nine

- b) twenty three
- c) three
- 5. It takes ---- years to gain a bachelor's degree.
 - a) 6
 - b) 4
 - c) 5
- 6. The academic year is divided into ----- terms.
 - a) 2
 - b) 3
 - c) 4
- 7. The campus includes ----- academic buildings.
 - a) 8
 - b) 7
 - c) 9

111. Speech practice

1. Prove that:

- a) The university is one of the oldest and prestigious educational institutions in Ukraine.
- b) The university is a research centre.
- c) The students of the university have a nice campus.
- d) The students have all opportunities to become skilled specialists.

Use the following words and phrases: I think that ...; Frankly speaking ...; I'd like to call your attention to ...; This is my point of view ...; I'm sure that ...

2. Get ready to speak about:

- a) the history of the university;
- b) the campus of the university;
- c) academic facilities at the university;
- d) extra-curricular activities (sport, social and cultural events).

3. Write about your faculty using the following words and phrases:

As for me; to study at; I'm a first year student; dean; full-time department; tutor, dean's office; academic building; to occupy; to be located; to be founded; to train; to work at; students specialize in; laboratories; tuition fee.

4. Do you know that:

Oxford and Cambridge universities came into existence in the Middle Ages. By the twelfth and thirteenth centuries the towns were growing and there was a need for educated people to cope with affairs that were becoming more complex. There was a greater interest in learning. Soon, the University of Oxford was known throughout Europe.

Cambridge originated later when some of the scholars left Oxford and started to teach in a little market town called Cambridge. In both cases these universities' students attended long courses of lectures. The lectures took place in cold, unheated rooms and started early in the morning. The university offered students nothing but lectures which they attended only if they wanted to.

There was a sort of examination but not a very rigorous one. Students saved money to come to Cambridge. Some of them lived in poverty and were half starved. But there was one main motive; if they could get their university degree, jobs lay ahead. Many of them, however, lived a wild life gambling, drinking and fighting a great deal.

Surprisingly quickly they became rich, autonomous and far more important individually than the university. And the university was poor. No one left it money. Before the end of the sixteenth century the colleges did all the serious teaching. The reputation of a college depended on the popularity of its teachers. By the nineteenth century, drastic changes were visible everywhere. The country needed scientists. It needed

every kind of expert knowledge. The university courses were revolutionized. It became possible to study natural science, and the Cavendish, the most famous of scientific laboratories, was built in 1874.

The first women's college was founded later in the nineteenth century. Up till then education was left only to men. But a few women started a college on the outskirts of Cambridge. However, it was not until after World War II that women were finally allowed into the university and allowed to take degrees. Now there's several women's colleges and several mixed colleges and the number of mixed colleges is increasing.

At present, the university is, in fact, a sort of federation of colleges. The lectures and examinations take place at the university, the degrees are conferred by the university too, but there is no single building which can be called "the university". As to colleges they can choose their own students who belong not only to the college but also to the university. Thus one is a member of a college and at the same time a member of the university.

5. Discussion points.

1. The historical background of Oxford and Cambridge.
2. The Universities of Oxford and Cambridge.

Laboratory work «Great Britain»

1. Pronounce and memorize the following words:

island - острів

separate – окремий, відокремлювати

mountain - гора

canal – канал

picturesque – мальовничий
mountainous – гірський
lake - озеро
climate - клімат
mild – м'який
weather - погода
textile - текстильний
food – харчування, продовольство
town - місто
monarchy - монархія
business - бізнес
fashionable - модний
quarter - квартал
art - мистецтво
gallery - галерея
store - магазин
rise - підніматись
connect – з'єднувати
damp - вологий
week - тиждень
majority - більшість
stretch - простягатись
cover – охоплювати, покривати
lie - лежати
sharp - різкий

2. Pronounce and memorize the following geographical names:

Great Britain – Велика Британія
Europe - Європа
North Sea – Північне море
Gulf Stream - Гольфстрім
Birmingham - Бірмінгем
Cambridge - Кембрідж

The Thames - Темза

London - Лондон

West End – Вест Енд

East End – Іст Енд

Windermere - Віндермір

Oxford - Оксфорд

Sheffield - Шефїлд

Liverpool - Ліверпуль

Manchester Манчестер

Bristol - Брістоль

Glasgow - Глазго

Tyne - Тайн

Trent - Трент

Severn - Северн

3. Pronounce and memorize the following word combinations:

an island country, three thousand feet, the inland waterways, a great deal of, the rainfall in Britain, advanced industrial country, world power, metal-working industry, by manufacture and trade, the Houses of Parliament, the House of Commons, fashionable quarters, in general, to be rich in, as for, to be engaged in, raw materials

4. Read and translate the text:

GREAT BRITAIN

Great Britain is an island country. It is separated from the continent of Europe by the English Channel and the North Sea.

The greater part of Britain is level. The highest mountains, which rise to a height of about three thousand feet, are in the North-West.

There are many rivers in Britain, but they are not very long, the longest being the Severn. Many canals are known to have been

built to connect the island water ways.

Some parts of Great Britain are very beautiful and picturesque. In the mountainous North_West there are many fine lakes, this part being called the Lake District. There is a great deal of rain there. In general the rainfall in Great Britain is greater than in the rest of Europe. Due to the Gulf Stream the climate of Britain is mild and damp. The weather is very changeable.

In the 19th century Great Britain became the most advanced industrial country in the world. But now it is no longer the world power that it was. Today it has a highly developed industry, the textile being the most important one. After it comes the metal-working industry.

Britain is known to be rich in coal and iron ores. As for raw materials it has to import most of them from other countries. Britain does not grow enough food to feed the population, it has to import the food. The people of Great Britain are said to eat home-grown food only on one day of the week.

The majority of the working population of Great Britain are engaged in industry. Eighty per cent of the population lives in towns.

Britain is a parliamentary monarchy, but in practice it is governed by Parliament that consists of the House of Lords and the House of Commons.

London is the capital of Great Britain. It is one of the largest cities in the world. It stretches for nearly thirty miles from north to south, and for nearly thirty miles from east to west, this is known as "Greater London".

The "City of London" is a very small part, it does cover only one square mile. The City is often called the commercial heart of London. Fleet Street, a well-known street in the City, is known as the home of British journalism.

London is a city of striking social contrasts. The West End which lies to the West of the City is the fashionable quarter of London. One can see the finest theatres, cinemas, concert halls, the

largest museums, art galleries, best hotels, restaurants, the biggest shops and department stores there.

The East End of London is the district of factories and docks. Most of people living there are workers. You will not find big parks, green gardens, high comfortable houses there.

There are many other big cities in Great Britain, most of them being ports, such as Liverpool which is the second largest port, Manchester, which is an inland port, Bristol, Glasgow and many others.

Exercises

5. Answer the following questions:

1. Where does Great Britain lie? 2. You know what city is the capital of Great Britain, don't you? What city is it? 3. Is area of Great Britain more or less than 244,000 square km? 4. Are mountains of Great Britain high? 5. Do you know what the population of our country is? 6. What can you say about the climate of the British Isles? 7. Why is the climate of the British Isles somewhat warmer than that of the continent? 8. What are the outstanding features of the climate of Great Britain? 9. How many political parties are there in Great Britain? 10. Through what ports do more than half of the goods exported and imported by Great Britain go?

Where to Stay & Eating Out

Britain's large town and city hotels offer every comfort that you'd expect - central heating, bedside radio, TV, coffee-making facilities and private bathrooms. There will be a restaurant and bar (sometimes several) on the premises. An increasing number of hotels have leisure facilities for their guests, whilst some may have local arrangements for outdoor activities. Hotels and restaurants are obliged by law to display current prices prominently.

CLASSIFICATION AND GRADING SCHEME

Throughout Britain thousands of places to stay are inspected regularly by the tourist boards and are classified according to the range of facilities and services provided - maximum Five Crown. Those offering higher quality standards have the term Approved (Merit in Wales), Commended, Highly Commended or Deluxe alongside their classification. Look out for the signs.

HOW TO BOOK

In most cases, you can book accommodation through your local travel agent or direct with hotels or hotel group representatives.

Alternatively, on arrival in Britain you can make use of the network of Tourist Information Centres (TICs). Details of the useful TIC accommodation booking services such as Book-a-Bed-Ahead are given in booklets. There are also hotel booking desks at airports and main railway termini, and the British Travel Centre in London offers an accommodation booking service, and can provide up-to-the-minute information on availability.

For accommodation in London, the London Tourist Board runs a Telephone Accommodation Booking Service (TABS) for Access, Mastercard and Visa cardholders, on 071-824 8844. The service is available Monday to Friday, from 09.30 to 17.30 hrs, and is provided by expert multilingual staff. There is a charge of £5 for this service.

Bed and breakfast (B&B for short) offers real value for money, a friendly welcome and the best chance to meet the British. You'll find B&Bs in towns, resorts and villages throughout Britain. Some are private houses, others are old-world country pubs, yet more are farmhouses. You don't have to book in advance ... just look for the sign saying B&B and knock at the front door. For more information about bed and breakfast - ask at BTA offices for the leaflet Britain: *Bed & Breakfast*.

Guest houses, found mainly in seaside towns and other tourist

centres, are slightly more expensive but have more bedrooms and bathrooms.

Farmhouse bed and breakfast. If you would like to travel around rural Britain, then staying at the numerous farmhouses offering 'bed and breakfast' or self-catering accommodation is ideal, and good value for money. Ask at BTA offices for a copy of *Britain: Stay on a Farm*.

Hospitality home-stay. If you would like to stay in a British home and experience the British way of life, then ask at BTA offices for a copy of *Britain: Stay in a British Home*.

Holiday homes. You can easily rent an apartment, house or cottage for the length of your stay. Generally, all household requisites are supplied and a deposit is payable before occupying the premises. Discounts can be obtained during the off-peak season. Ask at BTA offices for *Britain: Self-Catering Holiday Homes*.

Canal-boat holidays. How about hiring your own traditional narrow-boat for a self-drive-cruise along some of our 2,000 miles (3,220 kms) of picturesque canals? No previous boating experience is necessary - and it's a great way to discover the Britain most tourists miss -ask BTA for further details.

APARTMENTS IN BRITISH CITIES

Many visitors coming to British cities choose self-catering accommodation as an alternative to hotels. There is a wide range of apartments to choose from, but be sure to book well in advance. Household requisites are sometimes supplied and a deposit, or sometimes the full balance is payable before occupying the premises. When booking, be clear as to what is included in the price and any procedure regarding cancellations. Charges vary according to season, location and number in party.

The BTA's free booklet *City Apartments* lists a variety of letting agencies, apartment rentals and serviced blocks in Britain's cities,

including the capital. Other useful sources are British newspapers such as The Times, Sunday Times and the London Evening Standard.

PRICE GUIDE

Apartment in London:

for four people, per week: from £160.00 to £2,000.00

Budget hotel (in London): Room for two persons, incl. bathroom and breakfast, per night from £35.00 to £65.00

A farmhouse BAB *provides a* real home-from-home - but someone else makes *the tea!*

Average hotel (in London): Room for two persons, incl. bathroom and breakfast, per night from £70.00 to £150.00
Average hotel (out of London): Room for two persons, incl. bathroom and breakfast, per night from £50.00 to £90.00

Bed and breakfast (out of London): per person, per night from £12.50 to £30.00

Guest house (out of London): per person, per night from £20.00

Farmhouse: bed, breakfast and evening meal, per person, per night from £19.00 to £30.00

Holiday home accommodation: cottage for four, per week from £95.00 to £1,100.00

Prices (*which include tax*) are for guidance only. When making your hotel booking, ask about special offers for reduced room rates; you can save as much as 50% if you come between October and March - especially if you book for two nights or more. In B&Bs and guest houses you will generally be required- to pay in cash - they do not usually accept credit cards.

Deposits and cancellations. Most establishments request a deposit in advance when a written confirmation is being made; this may be forfeited if the reservation is cancelled and the proprietor is unable to re-let the room. In Britain, acceptance of an hotel booking, by telephone or in writing, is generally regarded as a legally binding contract. If you have to cancel a reservation, do

EATING OUT

Good British dining starts early in the day with a hearty breakfast of sausage, tomato, bacon and egg, plus toast and marmalade, and all the tea or coffee you can drink; This full breakfast is served in hotels, B&Bs and cafés everywhere. At lunchtime the most popular venue is the local pub, where you can usually get a good meal, such as 'shepherd's pie' (minced beef topped with creamed, crispy-top potato) or a wide selection of salads for around £3.50. Pubs normally serve lunches between about 12.00 and 14.30 - get there early to make sure of a seat

Come the mid-afternoon, the perfect way to take a break is to stop at a cosy tea-shop or hotel for tea. The British love their pot of tea, which is usually accompanied by a mouthwatering assortment of homemade cakes and scones.

Dinner-time means a whole world of good food is waiting to be enjoyed. First choose your venue: maybe a London hotel roof restaurant with a sparkling view over the city; or an intimate restaurant with candle-lit tables. Britain has a fantastic variety of ethnic restaurants, particularly in the cities, Indian and Chinese restaurants are especially numerous.

The various National Tourist Boards have a scheme which promotes the exciting regional cooking to be found in restaurants around Britain. Look for the 'Taste of Scotland' and 'Taste of Wales' signs in restaurants.

Restaurant prices vary considerably. You could pay £30 or more per person for a delicious three-hours dinner à la carte, with wine, at a good restaurant. Or you could enjoy r steak and french fries at one of the eating house chains such as Berni Inns (370 establishments in Britain) for about £6, including a glass of wine.

Look out for restaurants displaying the **Restaurant Customers' Charter** sign in their windows. This is a guarantee that the establishment will conform to conditions set out in the

charter, such as offering a fixed price menu, indicating clearly whether or not a service charge is included, and completing credit card slips in full if the service charge is already added.

THE ENGLISH CLIMATE

England enjoys an insular climate. Summers are neither too warm nor winters too cold.

The English people often talk about weather. "Fine morning, Sir." "Looks like rain, doesn't it? Will it clear up, do you think?" "I wonder what the weather will be like? I hope, it'll keep fine."

Spring is the season when Nature returns to life. Tiny, light-green leaves cover trees and bushes, the grass is soft and green, and the air is full of the songs of birds. Vegetation grows rapidly in this season, for there are periods of sunshine broken by occasional showers. Clouds are continually floating across the sky, and after the rain one can see a rainbow, caused by the reflection and refraction of the sun's rays in the falling raindrops, which act as a prism, producing belts of colour — red, orange, yellow, green, blue and violet.

It seldom gets too hot in summer as there is generally a cooling breeze from the south-west, but the temperature may rise to ninety degrees in the shade (Fahrenheit, of course). Sometimes the sky is suddenly covered with low black clouds, and distant thunder indicates the approach of a thunderstorm, then flashes of lightning and loud rolls of thunder come together with rain. After the thunderstorm the air is remarkably fresh. The thunder has cleared the air and people enjoy good weather again.

In autumn the leaves turn yellow and reddish, and fall to the ground. Then most birds migrate to warmer countries. Autumn is the season of mists, of windy days, of biting east winds and of beautiful sunsets. A short period of warm, sunny weather in October is called an Indian summer.

The climate of the south of England is much milder than that of

Scotland. In the north the winters are harder. When there are eight degrees of frost in England it is freezing hard, and everyone complains of the cold. This is because the damp climate makes people feel the cold more. On a frosty morning hoar-frost covers the country. Icicles hang from the roofs of houses. When the ice on the lakes is thick enough, it is covered with skaters.

When the temperature rises the snow falls, but it does not last long because the snow turns to slush.

Though there are rather many days of bad weather in every season Englishmen spend much time out-of-doors and children like outdoor sports and games.

LONDON

London, one of the greatest cities in the world, is the capital of Great Britain, and a cradle of British tradition and culture.

London, with a population of more than 8 million people, is the largest city in the world after Tokyo and New York. It stands on the banks of the river Thames. The historical centre of London is the City.

The City is the financial centre of the United Kingdom. Here you can find St. Paul's Cathedral. Not far from it is the tallest column built by Sir Christopher Wren in memory of the Great Fire of London in 1666. It is 61 metres high. Fleet Street is famous for the newspaper offices of the "Financial Times", the "Daily Telegraph" and others.

The Houses of Parliament stretch along the Thames's North Bank. The Union Jack (the flag of the U. K.) flies from Victoria Tower only when Parliament is in session. Big Ben, the famous clock, is also in one of the Houses of Parliament's Towers. Near Parliament, in Westminster Abbey, is Poet's Corner, containing the tombs and monuments of famous poets, writers and musicians: Chaucer, Milton, Dickens, Handel and many others.

One of the best known museums is the British Museum, with its

library, reading room and collection of manuscripts. The National Gallery, which has one of the world's greatest art collections, is in Trafalgar Square. Nelson's Column is also in this square. The biggest department stores can be found in Oxford Street. Bond Street is famous for its elegant shops.

There are some parts of London which have distinctive features. For example, the West End is famous for fashionable shopping and entertainment centres; the East End is an industrial district; Westminster is the place for government offices, the City is a financial centre; and Soho is known for international (Greek, Italian, Indian) restaurants and many entertainments.

London has a number of fine parks and gardens, such as Kensington Gardens, Hyde Park, and Covent Garden. There are very many theaters, concert halls, and cinemas in the capital.

The world's oldest underground railway system called the "tube", is still one of the largest in the world. It has more than 275 stations. The famous red "doubledeckers" are also an important part of the public transport system. London, rich in history and culture, parks and shops, always welcomes its visitors.

a cradle — колиска

the City — Сіті

St. Paul's Cathedral ['seɪn 'pɔ:lz kə'ɔɪdrəl] Собор св. Павла

Sir Christopher Wren [sa: 'krɪstɒfə ren] сер Христофор Рен

to be in session — засідати

Westminster Abbey ['westmɪnstə 'æbɪj] — Вестмінстерське абатство

a tomb [tu:m] — могила

Trafalgar square — Трафальгарська площа

elegant ['elɪɡənt] — вишуканий

Soho ['souhəʊ] — Сохо

Kensington Gardens [kenzɪŋɡtən 'gɑ:dnz] — Кенсінгтон-Гарденз

Hyde Park [haɪd] — Гайд-парк

Covent Garden ('kɒvənt 'gɑ:dn] — Ковент-Гарден

a doubledecker — даблдекер, двоповерховий автобус

LONDON ART GALLERIES

On the north side of Trafalgar Square, famous for its monument to Admiral Nelson (Nelson's Column'), its fountains and its hordes of pigeons, there stands a long, low building in classic *style*. This is the National Gallery, which contains Britain's best-known collection of pictures. The collection was begun in 1824, with the purchase of thirty eight pictures that included Hogarth's satirical 'Marriage a la Mode' series, and Titian's "Venus and Adonis". The National Gallery is rich in paintings by Italian *masteis* such as Raphael, Corregio, and Veronese, and it contains pictures representative of all European schools of art such as works by Rembrandt, Rubens, Van Dyck, Murillio, El Greco, and nineteenth century French masters. Many visitors are especially attracted to Velasquez' 'Rokweby Venus' and Leonardo da Vinci's 'Virgin of the Rock's. On sunny days, students and other young people are often to be seen having a sandwich lunch on the portico of the Gallery, overlooking Trafalgar Square. Admission to the Gallery is free, as is the case with other British National galleries and museums, which are *maintained* by money voted by Parliament. Bequests of pictures have been made to the galleries, at times on a generous scale, by private individuals. Just behind the National Gallery stands the National Portrait Gallery, in which the visitor can see portraits of British monarchs since the reign of Richard II (1377-1399), and of historical celebrities such as Chaucer, Shakespeare, and Cornwell. Many of the pictures are by well-known artists. The National Gallery of British Art, better known as the Tate Gallery, was given to the nation by a rich sugar merchant, Sir Henry Tate, who had a taste for the fine arts. It overlooks the Thames, not far from the Houses of Parliament. English artists are naturally well represented here, and the Tate also has a range of modern works,

including some sculptures, by foreign artists. This, of all the London galleries, is the young people's gallery. It has been stated that three-quarters of its visitors are under twenty-five. The Wallace collection at Herdford House was formed by Lord Herdford and his half-brother, Sir Richard Wallace, who inherited the collection, which was given to the nation in 1897 by Sir Richard's widow. There is here a very fine display of weapons and armour, of *pottery*, miniatures and sculpture... The first floor of the building contains an *admirable assortment* of Boucher's pictures, besides excellent examples of the work of Fragonard, to mention only two artists. On a summer day, a visit to Kenwood House in Kenwood, on the northern side of Hampstead Heath, is well worth while, for here is a small collection of paintings, some by famous painters, that can be viewed in a relatively short time. Afterwards, one can go out into the charming grounds. One may sun oneself on the turf of the spacious *lawns*, or stroll by the *lily-pond* and then enter the little wood that half *surrounds* it. Kenwood House is maintained not by the government but by the Greater London Council.

Make questions about "London art galleries". Here are the answers:

1. On the north side of Trafalgar Square.
2. It began with the buying of thirty-eight pictures.
3. They have a sandwich lunch at the entrance to the National Gallery.
4. You do not have to pay to go in.
5. Private individuals have often left paintings to them.
6. He was rich and liked fine arts.
7. It is particularly young people who go there.
8. No, it was made by private persons, Lord Hertford and Sir Richard Wallace.

GOING TO THE THEATRE

London is very rich in theatres; there are over forty, in the West

End alone - more than enough to ensure that there will always be at least two or three shows running to suit every kind of taste, whether serious or frivolous. Some of them are specialists theatres. The Royal Opera House, Covent Garden, where the great opera singers of the world can be heard, is the home of opera and The Royal Ballet. The London Coliseum now houses the English National Opera Company, which encourages English singers in particular and performs most operas

in English at popular prices. Some theatres concentrate on the classics and serious drama, some of light comedy and revue, some on musicals. Most theatres have a personality of their own, from the old, such as the Theatre Royal (the 'Haymarket') in the Haymarket, to the more modern such as the recently opened Barbican centre in the City. The National Theatre has three separate theatres in its new building by Waterloo Bridge. At the new Barbican Centre the Royal Shakespeare Company have their London home -their other theatre is at Stratford-on-Avon. Most of the older London theatres are concentrated in a very small area, within a stone's throw of the Picadilly and Leicester Square tube stations. As the evening performances normally, begin either at seven-thirty or eight p.m. there is a kind of minor rush-hour between seven-fifteen and eight o'clock in this district. People stream out of the nearby tube stations, the pavements are crowded, and taxis and private cars maneuver into position as they drop theatre-goers outside the entrance to each theatre. This is another minor rush-hour when the performance finishes. The theatre in London is very popular and it is not always easy to get in to see a successful play. Before World War II theatre performances began later and a visit to the theatre was a more formal occasion. Nowadays very few people 'dress' for the theatre (that is, wear formal evening dress) except for first nights or an important 'gala' performance. The times of performance were put forward during the war and have not been put back. The existing times make the question of eating a rather tricky problem: one has to have either

early dinner or late supper. Many restaurants in 'theatreland' ease the situation by catering specially for early or late dinners. Television and the difficulty of financing plays have helped to close many theatres. But it seems that the worst of the situation is now over and that the theatre, after a period of decline, is about to pick up again. Although some quite large provincial towns do not have a professional theatre, there are others, such as Nottingham, Hull, Coventry or Newcastle, which have excellent repertory companies and where a series of plays are performed during one season by a resident group of actors. Some towns such as Chichester or Edinburgh have theatres which give summer seasons. Even in small towns a number of theatres have been built in the last few years to cater for the local population. **QUESTIONS:**

1. How many theatres are there in the West End of London?
2. What would you see on a visit to Covent Garden?
3. What is special about the National Theatre?
4. Where would you find many of London's theatres?
5. What would you notice about the streets in this area between seven fifteen and eight p.m.?
6. What difference did the war make to theatre-going?
7. What two things have had a bad effect on the Theatre in England?
8. What is the present situation in the theatre?

BRITISH AND AMERICAN ENGLISH

British and American people speak the same language — right? Wrong. Although they both speak English, there is an increasing number of differences between the two varieties of English. For example, Trudi Burns and Eileen Unwin recently spent a very similar day. Here, they describe the day's events. How many differences can you spot?

Trudi (USA):

I got up at seven-thirty. I put on my bath robe, went into the bathroom and turned on the bath-tub faucets. After my bath I ate

breakfast with my parents on the deck. Our apartment's on the fifteenth floor, so the view's terrific. At eight o'clock my mom and I took the elevator to the parking lot underneath our apartment block. First we stopped for gas, then she drove me to school. The freeway was really busy — automobiles everywhere. When I got to school it was raining. Luckily I'd brought my goloshes and an umbrella, so I didn't get wet.

School was OK except that we had a math test before recess. I think I flunked it. Anyway, after school I took a bus downtown to meet my sister, Susan. She became a grade school teacher after she left college last year. We ate out at a Chinese restaurant. Personally I don't like rice, so I ordered french-fries instead. Susan disapproved. After dessert and coffee we paid the check and left. It had stopped raining, but the sidewalks were still wet. Susan gave me a ride home, then I did a history assignment for the next day, watched a movie on TV and went to bed around 11.30. I was pooped!

Eileen (Great Britain):

I got up at half past seven. I put on my dressing gown, went into the bathroom and turned on the bath taps. After my bath I had breakfast with my parents on the terrace. Our flat's on the fifteenth floor, so the view's terrific. At eight o'clock my mum and I took the lift to the car park under our block of flats. First we stopped for petrol, then she drove me to school. The motorway was really busy — cars everywhere. When I got to school it was raining. Luckily I'd brought my Wellington boots and an umbrella, so I didn't get wet.

School was OK, except that we had a maths exam before break. I think I failed it. Anyway, after school I took a bus to the city centre to meet my sister, Susan. She became a primary school teacher after she left university last year. We went out for dinner to a Chinese restaurant. Personally I don't like rice, so I ordered chips instead. Susan disapproved. After sweets and coffee we paid the bill and left. It had stopped raining but the pavements were still

wet. Susan gave me a lift home, then I did some history homework for the next day, watched a film on the TV and went to bed at about half past eleven. I was really tired.

Stratford Welcome

Internationally famous as the birthplace of the world's greatest playwright, William Shakespeare, and as the home of the Royal Shakespeare Company, the historic town of Stratford-upon-Avon has a tradition for welcoming visitors from all over the world.

STRATFORD-UPON-AVON SHAKESPEARE'S COUNTRY

Stratford, with its variety of quality accommodation, makes an ideal base at any time of the year for exploring the many attractions in Shakespeare's Country, the area which perhaps best fulfils a visitor's expectations of England: rolling countryside, meandering rivers, timbered cottages, mellow stone villages and historic towns, stately homes and impressive castles.

The keynote is the variety of places to visit. Besides its historic and literary associations, this area has wildlife, farming and motoring attractions, which will appeal to families and groups looking for 'days out' ideas.

Boating on the River Avon - famous for its swans and riverside walks are a popular pastime; narrow boats moored in the Stratford canal basin add to the colourful scene and the canal towpaths are ideal for a peaceful stroll. National Hunt racing at Stratford Racecourse draws enthusiastic supporters. The town is renowned for its shopping and Friday street market, floral displays and splendid Christmas lights, for its pubs, restaurants and wine bars.

Main Attractions: Guide Friday(1) , Shakespearian Properties (2), Warwick Castle (3), Blenheim Palace (4), Ragley Hall (5), Butterfly Farm (6), World of I Shakespeare (7), Heritage Motor

Centre (8) and Royal Shakespeare Company (9).

Within easy access of the M40, the town is near the hub of Britain's motorway network and well situated for day visits or for touring.

Here are some suggestions to help you plan your visit to Shakespeare's Country:-

The following itinerary includes some of the region's highlights - all members of the Shakespeare Country Association of Tourist Attractions . Allow at least two hours for most attractions - half a day would be better..

Coming from London on the M40, leave at junction 9 for Blenheim Palace (4), at the Cotswold town of Woodstock. Rejoin the motorway and continue to junction 12 for the Heritage Motor Centre (8), at Gaydon, then to junction 15 for Stratford, Alcester and Warwick. At this point, take the turn for Warwick Castle (3), (A429) or for Alcester and Ragley Hall (5), following the A46, or continue into Stratford itself (A46/A439).

For a general panorama of the town and adjoining countryside, take the open-top double decker bus - Stratford and the Shakespeare Story - guided tour (1), which allows you to get on and off at the Shakespeare Properties (2). To appreciate the town and its fine buildings - some of the houses and hostelrys would have been familiar to Shakespeare - follow the self-guiding Town Heritage Trail or the black and gold signposts which direct you to the historic landmarks, all within easy walking distance. Visit the RSC Theatres (9), include a theatre tour, the World of Shakespeare and Waterside Studio Theatre (7), and the Butterfly Farm (6).

Other attractions: the Teddy Bear Museum; Brass Rubbing Centre; Shire Horse Farm; Charlecote, Upton House, Coughton Court (NT)



The UK is a parliamentary democracy with a constitutional monarch as Head of State.

The CONSTITUTION

The UK does not have a written constitution. Citizens' rights are made up from a combination of:

- common law
- statutes
- conventions

Important constitutional documents that do exist:

- Magna Carta (1215) restrained the power of the Crown
- The Bill of Rights (1689) extended Parliament's powers
- Reform Act (1832) reformed political representation
- Human Rights Act (2000) defined fundamental citizens' rights

Key elements of Human Rights Act:

- a code of values placed at the heart of UK culture and administration
- 14 Articles enshrining principles such as the right to life, the right to freedom of expression, and the right to an education

The MONARCHY

HM the Queen is head of the executive, part of the legislature, head of the judiciary, commander-in-chief of the armed forces and supreme governor of the Church of England. Today the monarch's political role is largely ceremonial, with the Queen acting on the advice of her ministers.

LEGISLATURE

Parliament consists of HM the Queen, the House of Lords and the House of Commons where elected members charged with representing their constituencies engage in debate and vote on national legislation.

EXECUTIVE

The Government: prime minister, cabinet ministers, junior ministers; government departments and bodies subject to ministerial control; devolved administrations in Northern Ireland, Scotland and Wales; local authorities and public corporations.

JUDICIARY

The legal system of courts, judges and lawyers determining common law and interpreting statutes as passed by the Legislature.

The legal system is based on:

- common law and equity based on layer upon layer of case law
- parliamentary statutes
- European Community legislation.

The Home Secretary has overall responsibility for the criminal justice system in England and Wales. In Scotland and Northern Ireland, it is the responsibility of the Minister for Justice and the Secretary of State for Northern Ireland, respectively.

PARLIAMENT

examines votes scrutinises debates

A parliament has a maximum five-year life.

Its life is divided into year-long sessions.

Each year, there are an average 168 'sitting' days, when MPs debate and pass new legislation.

The Houses of Parliament (Palace of Westminster)

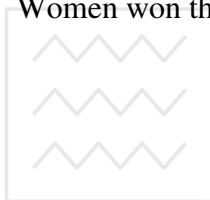
- covers 8 acres

- * has 11 courtyards; 100 staircases and two miles of passages

There are 9 parties with representatives, plus one independent member, elected to the present parliament.

MPs must declare all their financial 'interests' outside Parliament.

Women won the right to vote and stand for election in 1928.



Національний університет
водного господарства
та природокористування

The House of Commons	The House of Lords	The Monarch
Home: Westminster Palace	Home: Westminster Palace	Official residences: Buckingham Palace, Windsor Castle & Holyroodhouse Palace

• 659 elected representatives (Members of Parliament - MPs) • Party with majority support forms the Government * - Makes laws - Acts of Parliament	• 92 hereditary peers (with voting rights) • Over 550 life peers • 27 Law Lords • Archbishops of Canterbury and York and 24 senior bishops	• Head of State • Head of the judiciary • Political power is exercised in her name • Performs symbolic duties such as summoning Parliament
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The most a candidate can spend on an election campaign is £4,965 plus 4.2p for each elector in a borough constituency and 5.6p in a county constituency.

Anyone over 21 (with certain exceptions) can stand for Parliament after paying a £500 deposit — refundable if they get more than 5% of the vote in their constituency.

The Labour Party won the last election in 2001,

Since 1945 the Conservative Party has won 8 elections. The Labour Party has won 8 elections.

Process of making a Law

INSPIRATION & FORMULATION	Before it can be discussed, a new law must be drafted as a bill.
In the Commons, the Speaker Enforces the rules of the house, controls the behaviour of MPs	

FIRST READING	Bill introduced to House of Commons.
SECOND READING	Bill debated • controversial bills voted on • the vote is called 'a division'.
COMMITTEE STAGE	Clause by clause examination of the bill by special committee • May take into account outside groups' views of the bill.
REPORT STAGE and THIRD READING	Changes made at Committee stage reported to Parliament and debated.
HOUSE OF LORDS	Bill goes to Lords and passes through stages that echo those above • If the Lords alter anything the bill has to go back to the Commons for re-consideration • The Lords can only delay a bill for one parliamentary session and can't consider money bills, e.g. the budget.
ROYAL ASSENT	The bill becomes a statute or law receiving the monarch's official blessing.
IMPLEMENTATION	The statute or law is implemented.

Before the State Opening of Parliament in November the house is checked by the Yeomen of the Guard in commemoration of the search that uncovered the Gunpowder Plot of 1606.

The only MP permitted to drink alcohol in the House is the Chancellor of the Exchequer when delivering the budget speech.

The GOVERNMENT

Every year some 50,000 questions are asked in the ministers' question times that are held for 55 minutes each day from Mondays to Thursdays.

There are usually 20 ministers in the Cabinet - all chosen by the

Prime Minister.

All ministers must be members of the House of Commons or the House of Lords.

When ministers are changed it is called a cabinet 'reshuffle'.

The Lobby is a select group of journalists allowed access to the lobby of Parliament to talk to ministers.

The CIVIL SERVICE

It has 460,000 members, about 2% of the working population.

It advises Government and provides public services covering everything from agriculture to standards in zoos.

The National Audit Office checks to see whether state services are value for money.

Its 2000 report shows it saved the taxpayer £ 1.3 billion over the last three years.

DEVOLUTION

The Northern Ireland Assembly has 98 members and has full legislative and executive authority over specific areas of responsibility including education, regional development, health, social services and the arts.

The Scottish Parliament assumed legislative power in July 1999 and has 129 elected members. It has full law-making responsibilities.

The Welsh Assembly came into being in May 1999 and has 60 elected members. Its power extends to passing secondary legislation.

Welsh and Scottish MPs will continue to be elected to Parliament in Westminster.

LOCAL GOVERNMENT

These run local services raising money through Council Tax, boosted by cash from central government.

There are 387 local authorities in England. London has 32

borough councils.

The 22 local authorities in Wales spend half of the country's £8 billion service budget.

There are also 32 councils in Scotland and 26 district councils in Northern Ireland.

In July 2000 a London-wide authority with a mayor was created to take over responsibility for many of the capital's services.

Over 2 million people are employed by local authorities in the UK.

Local authority spending amounted to 25% of all public expenditure in 1999/2000-£81.2 billion.

Laboratory work „Ukraine”

1. Listen to the text, try to understand what it is about:

The term Ukraine first appeared in the chronicles of ancient Slavs in the 12th century as a geographical name of southern lands of the ancient Kiev Rus. In Ipatiy's chronicles of 1187 the southern- eastern lands bordering on Polovetsky steppe were called Ukraine. After this in 1213 the southern-western lands which bordered on Poland were also named Ukraine

Now Ukraine covers the territory of 603,7 thousand square kilometres and has the population of 46 million people. Two such countries as Italy could be located in this area. Ukraine's territory is the 42nd in the world according to its size.

In the west Ukraine borders on Poland and Slovakia, in the southwest on Hungary, Rumania and Moldova, in the north on Byelorussia, in the northeast on the Russian Federation. Ukraine's territory stretches for 1316 km from east to west and for 893 km from north to south. A major part of the territory are plains, with mountains being only in the west, the Carpathians, and in the extreme south of Ukraine, the Crimean mountains. In the south

Ukraine is washed by the Black Sea and the Sea of Azov.

Ukraine is a highly developed industrial and agricultural country. Its achievements in science and culture are known all over the world. One of the most important branches of national economy is the power industry.

Ukraine is rich in coal, gas, gold and other natural resources. The basis of industrial development is metal. For the output of cast iron, steel and rolled metal per capita Ukraine has already outstripped the USA and major European countries. Ukraine is one of the largest producers of winter wheat and also of industrial crops (especially sunflower seed and sugar beet). The Ukrainian scientists have discovered a way of manufacturing artificial diamonds and have developed methods of electric welding, they have made outstanding progress in nuclear physics, chemistry and other branches. They have created the first electronic computers in the world.

Kyiv is the capital of Ukraine and has the population of 3 mln. Kyiv is one of the world's most beautiful cities and one of the oldest in Europe. It marked its 1500th anniversary in 1982. The majestic Dnipro river, the picturesque hills on its banks and abundant greenery give it a charm of its own.

Ukraine was proclaimed an independent state on August 24th 1991. By the constitution the government is composed of three coordinate branches: the executive, the legislative and the judicial.

The executive power is vested in the president who holds office for 5 years. The legislative power is vested in the Supreme Council, parliament of Ukraine. The Supreme Court of Ukraine constitutes the judicial branch.

There are different parties in Ukraine and some of them are represented in the Supreme Council.

Being one of the founders of the United Nations Organization in 1945 Ukraine actively participates in its work aimed at preserving peace and friendship among different states.

2. Study the following words and phrases:

term – термін
abundant greenery – велика кількість зелені
achievements – досягнення
aimed at – направлений на
ancient – стародавній
artificial diamonds – штучні діаманти
branch – галузь, область
cast iron – чавун
chronicle – літопис
to appear – з'явитися
chronicle – літопис
century – століття
executive power – виконавча влада
industrial crops – технічні культури
judicial power – судова влада
legislative power – законодавча влада
natural resources – корисні копалини
output – продукція, випуск
outstanding – визначний
per capita – на душу населення
picturesque – мальовничий
plain – рівнина
rolled metal – прокат
steel – сталь
Supreme Council – Верховна Рада
to border (on) – межувати (з)
to call – називати
to manufacture – виробляти
to name – називати
to cover – займати, охоплювати
to be located – розміщуватись
to stretch – простягатись

to be washed – омиватись
to be known – бути відомим
to be rich in – бути багатим (на)
to outstrip – випереджати
welding – зварювання

3. Answer the following questions:

1. When did the term Ukraine appear for the first time? 2. In what historical document were the southern-eastern lands called Ukraine? 3. What territory does Ukraine cover nowadays? 4. What is the population of Ukraine? 5. What place does Ukraine take in the world according to its size? 6. What countries does Ukraine border on in the west? 7. A major part of Ukraine's territory are plains, aren't they? 8. Are there any mountains in Ukraine? 9. Ukraine is washed in the south by the Black Sea and the Sea of Azov, isn't it? 10. What is one of the most important branches of national economy? 11. What natural resources is Ukraine rich in? 12. Can you name some of the important achievements of Ukrainian scientists? 13. What is the capital of Ukraine? 14. What is its population? 15. Who is the legislative power vested in?

State System of Ukraine

According to the Constitution of Ukraine its territory is one and indivisible. There is the Crimean Autonomous Republic, 24 administrative districts and the cities of Kyiv and Sevastopol. Only the laws of Ukraine act on its territory. The main legislative body of Ukraine is the Supreme Council, which consists of 450 deputies. The deputies are elected by equal, secret and direct ballot. The highest executive body is the president. He can veto any decision of the Ukrainian Parliament. The president is the commander-in-chief of the armed forces of Ukraine. He also represents the state in the international relations. Another part of the executive branch is the

Cabinet of Ministers headed by the Prime Minister. The Cabinet of Ministers coordinates the daily administration of the government and may introduce bills to the parliament. The judicial power belongs to the Constitutional Court and regional courts. The state symbols of Ukraine are the national flag and the emblem. Azure-yellow state flag symbolizes the unity of blue sky and yellow wheat field. The little state emblem – trident – appeared first on the seals in times of Volodymyr the Great.

Constitution of Ukraine

The Constitution is the main law of each state. The Constitution of Ukraine was adopted on the 28th of June, 1996. It confirmed the main principles of our state, the rights, freedoms and duties of every citizen. It determines the order of the President elections, elections to the Supreme Council, state symbols, independence and sovereignty of Ukraine. The Constitution proclaims the freedom of speech, outlook and religion. The church and different religious organizations are separated from the state, and from the school. The Constitution also proclaims the right for political unions, meetings and demonstrations and participation in governing the state. The duties of the citizens are also included into the Constitution. The family, childhood, maternity and paternity are guarded by the state. The military service and tax payment are also the duties of citizens.

Geographical Position of Ukraine

Ukraine is situated in the south-east of Europe. The territory of Ukraine is mostly flat. The main rivers are the Dnieper, the Dniester, the Buh and others. The Dnieper is one of the longest

European rivers and one of the main sources of hydroelectric power in the country. The coasts of the Azov Sea and the Black Sea are good for ports. The geographical position of Ukraine is very favourable because the country lies on the crossroads of the ways from Asia to Europe. Since Kievan Rus Ukrainian roads have been used for trade contacts. Due to favourable climatic conditions, Ukraine is traditionally an agricultural country. Wheat, maize and other crops, vegetables, all kinds of fruit are grown here. The country produces planes and ships, lorries and buses, electronic equipment and agricultural machines, TVs and radio-sets and other goods.

Climate of Ukraine

The climate of Ukraine is mostly moderately continental. But the climate of the Crimea differs greatly from the other parts of the country. The climate there is subtropical. The winter temperatures in the Crimea are about 3 degrees above zero as the Crimean mountains stop cold winds from the north. The Carpathian mountains differ from the rest of the Ukrainian territory in the amount of rains. Summer is usually dry and not hot in Ukraine, but the Carpathian showers and thunderstorms often occur. Sometimes storms bring hail, which is very unfavourable for agriculture. Winter is usually mild, without severe frosts. Sleet is quite usual for Ukrainian cities and towns in winter. Fogs are not frequent in this country, but they may happen in autumn and spring.

Laboratory work “Rivne”

RIVNE

Rivne is the administrative, economic, educational and cultural

centre of the region. It is situated in the north-west of Ukraine on the banks of the Ustya river, a tributary to the Horyn river. The population of Rivne is about 250 thousand residents.

Rivne was first mentioned in manuscripts dating back to 1282. The town celebrated its 700th anniversary in 1983. During centuries Rivne was often destroyed by invaders and burned, that's why there are only a few ancient architectural monuments there. Among them of attention is a building of a former gymnasium where from 1866 to 1874 an outstanding writer Volodymyr Korolenko studied. Today the building houses the regional museum. The heroic past of our town is described in numerous books. It was here, in Rivne region, in the village of Plyasheva, near Berestechko, that the cossack regiments led by Khmelnytsky, Kryvonis, Bogun and Nechay battled the enemy during the liberation war of 1648-1654 being waged by the Ukrainian people against Polish domination. A magnificent monument to the heroes of Berestechko was unveiled on June 16, 1991.

The town has a lot of historical places and monuments associated with the period of the Civil War and the Great Patriotic War of 1941-1945. In the city park there is a grave of the hero of the Civil War Oleko Dundych. The monument to the victims of fascism towers over Bila street. Rivne wrote unfading pages into the history of partisan movement in Ukraine. The feat of our soldiers and partisans is immortalized in the monument on the Victory square. Prikhodko, Miryushchenko, Ostafov, Strutynskaya, Lisovskaya streets are named in honour of war heroes.

Today Rivne is an industrial centre whose output is known not only in Ukraine but also abroad. The high-voltage equipment plant, mineral fertilizers production association "Azot", tractor spare parts plant and others are the largest enterprises in the region. High-precision instruments, construction materials, furniture, consumer goods, amber decorations enjoy the demand in Ukraine and abroad.

The town has about 30 general educational schools, some

vocational schools and colleges. National university of water management and nature resources use and other higher educational establishments train skilled specialists for national economy, education and culture.

Rich and varied is the cultural life if our town. The residents of Rivne have the regional academic music and drama theatre, a puppet show, a regional philharmonic society, many linrarues, some museums and movie theatres.

The city possesses a well developed network of health facilities: hospitals, clinics, health centres.

Study the following words and phrases:

to be located – розташовуватись
agricultural machinery – с/г машини
amber decorations – бурштинові прикраси
ancient - стародавній
anniversary – річниця
consumer goods – товари широкого вжитку
fine arts school – художня школа
former – колишній
furniture – меблі
health facilities – лікувальні заклади
high precision tools – високоточні інструменти
high-voltage equipment – завод високовольної апаратури
manuscript – літопис
movie-theatre - кінотеатр
mineral fertilizers – мінеральні добрива
production association – виробниче об'єднання
puppet show – кукольний театр
regiment - полк
to destroy – руйнувати
to house – розмішувати
to be associated with – бути пов'язаним з

to mention – згадувати

to tower – височіти

to be immortalized – бути увіковіченим

to bear – носити

to unveil – урочисто відкривати

tractor spare parts plant – завод тракторних запчастин

tributary - притока

unfading pages – нев’ячнучі сторінки

varied – різноманітний

victim – жертва

vocational school – ПТУ

Answer the following questions:

1. Where is Rivne located? 2. Rivne is an administrative, economic centre of the region, isn't it? 3. What is the population of Rivne? 4. When is the first written mention of the city dated? 5. Are there any ancient architectural monuments in Rivne? 6. What outstanding writer studied in Rivne gymnasium? 7. What are historical places and monuments associated with? 8. What was Rivne during the Great Patriotic War? 9. What monuments can you find in Rivne? 10. Whose names do streets of the city bear now? 11. Rivne is an industrial centre, isn't it? 12. What industrial enterprises are there in Rivne? 13. What do they produce? 14. Are there any theatres in Rivne? 15. What higher educational establishments are there in our city? 16. Does the city possess any health facilities?

Make up dialogues based on the topic . Work in pairs.

Discuss the basic situations: You show your city to English speaking visitors; take them on a sightseeing tour; answer guests' questions.

RIVNE REGION

The Rivne region was founded on the 4th of December, 1939. It is situated in the north-western part of Ukraine and occupies the territory of 20100 sq. km. It borders on Zhytomyr, Khmelnytsky, Ternopil, Lviv and Volyn regions of Ukraine and Brest and Gomel regions of Belarus. As to the administrative territorial division the region includes 11 towns and 16 districts. The population of the region is about 1150000 people. The region has a favourable geographical location and a developed transport system. The region possesses a certain potential of natural resources: stones, limestone and other mineral building materials. Large deposits of amber are of great importance. Deposits of phosphorites, sources of mineral water have been discovered. The surface waters of the Rivne region include 170 rivers, many lakes and ponds. Industry and agriculture possess the leading place in the economy of the region.

Questions:

1. When was the Rivne region founded?
2. Where is it situated?
3. What regions does it border on?
4. How many districts does the region include?
5. Has the region a developed transport system?
6. What deposits have been discovered in the Rivne region?

Geography and natural environment

Rivne region constitutes 3,1% of the whole territory of the country. The climate of the region is moderately continental: soft winter with frequent thaws can be rather warm, quite often it rains in summer, the average annual precipitation is 600-700 mm.

Winter comes at the end of November, with firm snow cover appearing in closing days of December or the beginning of January. Summer which comes at the end of May proceeds to September, this period is characterized by the highest temperatures of air and soil. Clear, cool early autumn weather sets st the beginning of September.

The region is geomorphologically divided into Ukrainian shield, Volyn-Podillya platform, Galych-Volyn depression and Prypyat sagging.

All rivers in Rivne region belong to the basin of the Pripyat river. The largest lakes are the Nobel lake (4,7 sq.km.) and the Bile lake (4,5 sq.km.)

Laboratory work “My speciality”

WATER SUPPLY AND WATER DISPOSAL

Water is one of the main factors in man’s life. Man uses water for domestic, sanitary and industrial purposes and returns it to the source through sewage disposal system. In some localities water is available in unlimited quantities, in other providing a satisfactory supply of water becomes a large engineering task. In fact, only 1% of the earth’s water is not located in the oceans or ice caps. Of this small amount 95% is underground. All water on earth is continually recycled through the hydrologic cycle. Regardless of whether our supplies are drawn from the earth’s surface or underground protection of these supplies is always important.

SURFACE WATER

Surface water sources are usually fed from relatively large areas called watersheds, areas of land that drain into a specific river, lake, or reservoir.

Water utilities try to protect their sources of supply to preserve both the quality and quantity of this vital resource. We are concerned about the potential of our watershed areas to become contaminated. This can happen if a pollutant is accidentally spilled on the ground or into a body of water on the watershed kilometres above a treatment plant or reservoir. The pollutant can make its way, even in diluted form, into the water supply. Spills and accidents can happen suddenly and without warning.

The best way to control pollution is to prevent it from happening in the first place. In addition, we must monitor the activities occurring on the watersheds which could result in pollution.

GROUNDWATER

Groundwater is stored in small spaces between grains of sand or gravel or in fractures within more solid rock. Any underground layer through which water can pass is known as an aquifer.

Much of the water that falls on the land surface is absorbed into the ground. It moves downward through the soil, sand and gravel until it reaches consolidated rock or fine grain soils like clay through which it cannot easily pass. During this process many natural contaminants such as dirt, mud and bacteria are removed by the soil.

Groundwater is obtained by drilling a well into an aquifer.

While the soil acts as an excellent filter for naturally occurring contaminants it cannot remove most man-made contaminants. Pollution of groundwater occurs when organic compounds such as degreasers, drycleaning solvents and some home cleaning chemicals are spilled or disposed of on the ground. These organic chemicals quickly penetrate the soil and enter the underground source of water. Once in the ground, these chemicals are difficult and very expensive to remove.

WATER QUALITY STANDARDS

The development of human society has resulted in the changing of the composition of natural water resources. Rivers, lakes and ground waters contain today a great amount of products of mechanical, chemical and biological pollution.

Nitrate can be present in streams or wells if fields used for farming have been overfertilized. In this case traces of nitrate wash into the stream or absorb into the groundwater.

Pesticides and PCBs are man-made chemicals used in farming and industry. If these chemicals are improperly disposed of or misused they can be present in our rivers, streams, reservoirs, lakes or springs. In order to detect pesticides in water supply samples are taken during the time of year when these contaminants are most likely to be present, usually late spring or summer.

Volatile organic chemicals are also man-made and are commonly used in industries such as drycleaning as well as those using petroleum products. If these materials are not properly disposed of and are spilled on or buried in the ground they can travel through the soil and enter the groundwater table, the underground reservoir of water which serves as the source of water for many wells.

The waste products are of two general types sewage and refuse. Both sewage and refuse must be removed promptly. The removal of sewage is done by sewers which are a part of a sewerage system. The usual methods of sewage treatment consist of preliminary, primary, secondary or auxiliary treatment.

KEEPING WATER SUPPLY SAFE IN DISTRIBUTION SYSTEM

A water supply system consists of a source of water, a reservoir for storing water, a treatment plant for removing impurities from water and a distribution system of pipes for delivering the water.

Once the source of water has been adequately purified we must

make sure the water which reaches our home remains high in quality. Numerous precautions are taken to assure that this quality is maintained as water passes through many kilometres of pipeline in the distribution system.

CHLORINATION

In order to maintain a bacteriologically safe distribution system it is necessary to maintain a chlorine concentration throughout water mains. The level of chlorine in the water as it leaves the treatment plants and enters the system is consistent and carefully controlled. Monitoring devices located at the treatment plants measure the chlorine level in the water on a continuous basis.

CORROSION CONTROL AND LEAD

Controlling water's natural tendency to corrode distribution piping as well as customers' plumbing is an important priority. For this reason, we add various chemicals to minimize the corrosivity of water and we also collect samples throughout the distribution system to ensure that these corrosion control methods remain effective.

Lead in drinking water is a serious concern. Lead can enter the water supply through lead service lines, through the lead solder used to join copper piping in customers' homes or through molded metal faucets containing lead.

We advise all customers to run their water approximately two minutes each morning before using it for drinking or cooking. By running the water traces of lead which may have entered it from lead sources will be removed and replaced by water from distribution main.

FLUSHING

In order to eliminate stale water from the distribution system and to remove traces of sediment and corrosion which may accumulate in water lines. we regularly flush out distribution

system. Allowing the water to run for a few minutes should remove the discoloured water and return the quality to normal.

WATER ENGINEERING

Rapid industrialization of the country has made the problem of water supply and water disposal very acute. We need to find new ways of using water at home, in industry and agriculture and of improving the technology of sewage purification.

Water engineering or water and environmental management is primarily concerned with the management and supply of clean water, the disposal of waste water and sewage, flood prevention and sea defences and the maintenance of waterways for transport and leisure purposes. The broad nature of the work is well illustrated by the range of projects which water engineering embraces. These can include the design, construction and maintenance of water and waste water works and related equipment, including reservoirs, pipelines and pumping stations. To achieve these objectives the water industry has had to develop a multi-disciplinary approach, with graduates coming from both scientific and engineering backgrounds.

This profession attracts a great number of young men and women as an honourable profession. The person entering this profession must have scientific attitude, imagination, initiative and good judgement obtained by experience and serious work. Sanitary engineers have an important aim-to provide people with all modern conveniences for a dwelling.

Ukrainian National University of Water Management and Nature Resources Use trains future sanitary engineers at the faculty of town planning and development. Students get good scientific training and study the existing industrial methods. When they become full-fledged engineers they will develop new ones.

Their course of study includes general scientific subjects (history of Ukraine, political economy, philosophy, politology, higher mathematics, computer science, physics, chemistry,

descriptive geometry, drawing, theoretical mechanics, strength of materials, electrical engineering, technology of metals, building materials, a foreign language etc.)

General technical training is provided for by hydraulics, geodesy, hydrology, architecture, building constructions, building machines, heating and ventilation etc.

Special subjects include microbiology and chemistry of water, water supply, sewerage, sanitary engineering, pumps and pumping stations, safety engineering, production engineering, economics of water supply and sewerage systems etc.

The study of theory is accompanied by industrial and exploitation training enabling students to test their vocational preferences. Work experience helps them to obtain occupational and survival skills and establish a relationship with a particular employer which may lead to the offer of a permanent job after the graduation from the university. The engineer should know the perspective problems connected with vocational guidance such as the usage of new technologies, of up-to-date industrial methods.

After the graduation from the University young specialists are able to work as foreman, construction superintendents, design engineers, surveyors, health and safety engineers, junior and senior research workers, etc.

The graduates may have their follow-up education at post-graduate courses and during in-service training. They participate at international exhibitions, conferences, congresses and symposia.

Words and expressions for the text comprehension:

Absorb	поглинати
Accident	випадок
Accidentally	випадково
Accompany	супроводжувати
Accumulate	накопичуватись
Acute	гострий, актуальний
Add	додавати

Adequately	належним чином
Advise	рекомендувати
Amount	кількість, величина
Approach	підхід
Approximately	приблизно
Aquifer	водоносний шар
As well as	також
Assure	гарантувати
Attitude	нахил
Auxiliary	додатковий
Available	доступний, наявний
Background	підготовка
Be concerned about	бути стурбованим чимсь
Body of water	водоймище
Bury	поховати
Chemical	хімічна речовина, реагент
Chlorination	хлорування
Clay	глина
Composition	склад
Concern	турбота
consistent	узгоджений, постійний, послідовний
Construction	побудова
Contaminant	забруднююча речовина
Contaminate	забруднювати
Continually	безперервно
Conveniences	зручності
Cook	готувати(їжу)
Copper piping	мідні труби
Corrode	кородувати
Corrosion	корозія
Corrosivity	корозивність
Customers' plumbing	водопровідна система у клієнта
Degreaser	засіб (пристрій) для



Deliver	обезжирювання
Diluted form	постачати
Dirt	розжижена (жидка) форма
Discoloured water	бруд
Dispose of	знебарвлювана вода
Distribution piping	усувати
Distribution system	система розподільних труб
Domestic	система розподілу
Downward	побутовий
Drain	вниз
Draw	стікати, витікати
Drycleaning solvents	здобувати
Dwelling	розчини для сухого очищення
Eliminate	житло
Embrace	усувати
Employer	охоплювати
Ensure	роботодавець
Environmental management	забезпечити
Expensive	менеджмент довкілля
Farming	дорогий
Faucet	с\г
Feed	кран
Fine grain soils	живитися
Flood prevention	дрібнозернисті ґрунти
Flush	попередження паводку
Follow-up education	спускати (воду), промивати
For this reason	продовження освіти
Foreman	з цієї причини
Fracture	майстер
Full-fledged	розлом
Good judgement	цілком підготовлений
Graduate	здоровий глузд
	випускник

Grain of sand	зерно піску
Gravel	гравій
Groundwater table	рівень ґрунтових вод
Happen	траплятись
Honourable	почесний
hydrologic cycle	гідрологічний цикл
Ice cap	льодова шапка
Imagination	уява
Improperly	неправильно
Improve	покращати
Impurity	домішок
In addition	крім того
In order to	для того, щоб
Industrial training	виробнича практика
In-service training	підвищення кваліфікації без
Lead	відриву від виробництва
Lead solder	свинець
Lead to	свинцевий припіп
Leave	привести до
Leisure	покидати
Level of chlorine	дозвілля
Likely	рівень хлору
Locality	ймовірно
Locate	місцевість
Maintain	розміщувати
Maintenance	підтримувати
Make sure	експлуатація
Man-made	впевнитись, гарантувати
Measure	штучний
Minimize	вимірювати
Misuse	зменшити
Mold	неправильно використовувати
Monitor activities	відливати, формувати
	контролювати за діяльністю

Monitoring devices	прилади(заходи) контролю
Mud	бруд
Natural	природний
Natural tendency	природна тенденція
Nitrate	нітрат
Objective	мета
Obtain	отримувати
Occupational skills	професійні навички
Occur	траплятись
On a continuous basis	на постійній основі
Organic compound	органічна сполука
Overfertilize	занадто удобрити
Permanent	постійний
Petroleum products	нафтова продукція
Pipeline	трубопровід
Pollutant	забруднююча речовина
Post-graduate course	аспірантура
Preliminary	попередній
Prevent	запобігати
Primarily	головним чином
Primary	основний
Priority	пріоритет
Production engineering	організація виробництва
Promptly	швидко
Provide	забезпечувати
Pumping station	насосна станція
Purify	очищати
Range	коло
Rapid	швидко
Recycle	проходити цикл, повторно переробляти
Refuse	тверді відходи
Related equipment	зв'язане з цим обладнання
Relationship	зв'язок

Remain	залишатись
Remove	усувати
Replace	заміняти
Research worker	науковий співробітник
Result in	привести до
Safety engineer	інженер з техніки безпеки
Sample	проба
Sanitary engineer	інженер-сантехнік
Sanitary engineering	сантехніка
Sea defence	захист від моря
Secondary	вторинний
Sediment	осад
Service line	лінія обслуговування
Sewage disposal system	система відводу стічних вод
Sewer	колектор
Sewerage system	система каналізації
Solid rock	міцна порода
Source	джерело
Space	проміжок
Spill v. ,n.	розливати, виливати, вилив
Spring	джерело, струмок
Stale water	застаріла вода
Store	зберігати
Stream	струмок
Superintendent	виконроб
Supply	постачання
Surface water	поверхнева вода
Surveyor	вишукувач
Survival skills	навички виживання
Throughout	на протязі
To run water	спускати воду
Trace	слід, залишок
Treatment plant	очисна споруда
Underground	підземний

Underground layer	підземний шар	
Unlimited	необмежений	
Up-to-date	сучасний	
Vital resource	життєво важливий ресурс	
Vocational guidance	професійне спрямування	
Vocational preferences	професійні пріоритети	
Volatile	летючий	
Warn	попереджувати	
Water engineering	водний менеджмент (господарство)	
Water main	водна магістральна труба	
Water utilities	водні споруди	
Water works	водні споруди	
Watershed	вододіл, басейн ріки	
Waterways	водні шляхи	
Well	колодязь, свердловина	

Exercise 1. Read and translate the text.

Exercise 2. Read the text again to find out:

- Why problems of water supply and water disposal become very acute;
- How groundwater is polluted;
- How corrosion control is done.

Exercise 3. Use answers to the following questions to develop the conversation:

- For what purposes does man use water?
- What does a water supply system consist of?
- What methods of sewage treatment do you know?
- How are surface waters contaminated?
- How does nitrate penetrate into streams and wells?
- What are pesticides?

7. What are usual methods of sewage treatment?
8. Are volatile organic chemicals man-made?
9. Why is it necessary to chlorinate drinking water?
10. How does lead penetrate into drinking water?
11. How do you eliminate stale water from the distribution system?
12. What is water engineering concerned with?
13. What general scientific subjects do sanitary engineers study?
14. Where may graduates have their follow-up education?
15. What types of wastes do you know?

Exercise 4. Speak on one of the following topics using helpful hints given below: in my opinion, from my point of view, as far as I am able to judge, it is quite obvious that, it has been emphasized...

1. Water in human life.
2. Volatile organic chemicals.
3. Ways of polluting ground waters.
4. Ways of preventing water pollution.
5. Professional training of sanitary engineers at NUWMNRU.
6. Posts held by NUWMNRU graduates

Exercise 5. Read questions and answers to find out water contaminants.

What is the difference between “hard” and “soft” water?

Hardness is a term used to describe the calcium and magnesium content of water. Excessive hardness can cause scale to be deposited in boilers and pipelines and requires the use of large

amounts of laundry soap. The use of home water softeners adds sodium to the water.

What causes “rusty” water?

Discolored water can result when naturally occurring sediment in pipelines is disturbed. This sedimentation consists of calcium which comes from the water and rust which is formed by the corrosion of pipes or from the water itself. It usually appears in the home plumbing system when a flow increase is caused by main breaks or the use of fire hydrants. Usually the problems can be cleaned by allowing the water to run for short periods.

Why must chlorine be added to the water?

Chlorine is added for your protection. It is a disinfectant and must be present to ensure continuous protection against contamination. The level of chlorine in the water is at a very low level, ordinarily about 1mg/l.

What makes the water appear milky?

Milky looking water is caused by air which can be trapped in the plumbing system, or in the distribution mains. Allowing the water to run will usually clear it. In the meantime, the water is safe. The air in it causes no health problems.

How can we prevent potential exposure to lead in our home plumbing system?

Let water from an unused faucet run before drinking. If the water in the house has been used for flushing toilets, showers, or doing laundry, 30 seconds of flushing is fine, if not let the water run approximately two minutes before drinking. In addition, use

only cold water for drinking and cooking. Hot water is more apt to dissolve lead.

Is your water fluoridated?

Fluoride is added to public water supplies for the sole purpose of reducing tooth decay in persons drinking the fluoridated water. A level of approximately 1.0 mg. l of fluoride is maintained in the water which is considered as optimum.

Exercise 6. Read the text to find out job opportunities for sanitary engineers in Great Britain.

EMPLOYMENT AND TRAINING IN GREAT BRITAIN

Opportunities for employment in the water industry are increasing across a range of companies as a result of tightening legislation regarding the quality of drinking water, better river quality, increased usage of water for recreational purposes and European Commission legislation.

Employers of civil engineers in this sector include the newly privatised companies, the National Rivers Authority, the river purification boards, the British Waterways Boards, consultant engineers and the privatised Water Research Centre (WRC). The latter provides research, engineering and environmental services to the water and waste water industries. Professional bodies which have members involved in water engineering are the Institution of Water and Environmental Management and the Institutes of Biology and Geology.

The type of training will be influenced by the employer and the relevant professional body. Training can last from two to five years and usually comprises induction, on-the-job projects, specific courses for skills training, site and design work and the acquisition of management skills.

Once qualified, prospects for overseas travel are good,

particularly with a specialist consultancy. The average starting salary is 12. 500-13. 000 pounds a year.

Scotland has developed its own national water policy, i. e. nine Regional Councils and three Island Area Councils have the joint responsibility for the supply and treatment of water and sewage disposal.

Exersice 7. Read the text and discuss types of taps and the method to repair the tap.

TAPS

There are various types of taps in use but basically they are usually of the “bib” (fixed to the wall) or “pillar” (fixed directly onto the sink or bath) types. Both operate the same way but the pillar tap has a cover which has to be unscrewed to get at the washer. The best type of washer to use is one made of synthetic rubber or nylon. If these cannot be obtained use only hard washers for hot taps and soft for cold. A dripping tap is usually a sure sign that the washer needs replacing. Alternatively there may be a leakage from around the gland nut. This can easily be rectified by gently tightening the gland nut until seepage stops.

HOW TO RE-WASHER A TAP

1. Turn the water off at the stop tap.
2. Open tap fully.
3. Unserew cover (anticlockwise) and lift as high as possible to expose hexagon on head of tap. Where easy clean cover is combined with top of tap, remove tap and cover completely by unscrewing retaining screw of top.
4. Use spanner on hexagon and unscrew (anticlockwise) head of tap and remove.
5. Fit new washer.
6. Replace head and cover of tap.

7. Shut tap, open stop valve and check up tap for correct working. There is a risk of cracking the basin if too much force is used to unscrew the tap. Avoid this by supporting the tap with a wedge of wood and use minimum force to unscrew the hexagon.

8. Do you know that

- a dripping faucet can waste as much as 20 gallons of water a day

- an American family of four uses up to 360 gallons of highly treated water a day:

 - about 260 gallons in the home... and 50-100 gallons outside, for car washing and to water lawns and gardens

 - operating costs of all U. S. sewage plants run in excess of 13 million dollars a day

 - to flush a toilet one time we use 5-7 gallons of water

 - when the toilet leaks for 6 months we use 45000 gallons of water

 - to make a ten minute shower we use 40-70 gallons of water

 - to run the tap two minutes while brushing teeth we use 5-7 gallons

 - In some parts of the sunbelt in the USA groundwater is being withdrawn from wells at the rate of 24 to 36 inches a year. Nature, through rainfall, is replacing just 5-10 inches a year and less than an inch in parts of Texas and Oklahoma.

Exercise 9. Read some hints for water use and discuss them:

- don't use the toilet as an ashtray. Flushing away six gallons of water is an expensive way to dispose of a cigarette

 - keep a bottle of cold drinking water in the refrigerator

 - water during the cool of the day, early in the morning or at dusk, to minimize water loss by evaporation. Don't water on windy days.

 - conserve soil moisture around trees and garden plants (and discourage weeds) by mulching with leaves, lawn clippings, or even

strips of plastic

-if you are unfortunate enough to suffer frozen pipes or a burst:check the system for split pipes or broken joints, open the tap and apply heat gently working along the pipe from the top end with an electric fan heater or hairdryer, get expert advice

-if a drain should become blocked make sure that the gully and trap are clear of solid wastes, then flush out

-when changing the water for your goldfish let the water stand for 24 hours to allow the chlorine to dissipate

-to see how a toilet works remove the lid, pull the handle and watc

Методичні вказівки з рольових ігор по водних ресурсах.

Одним із шляхів підвищення ефективності навчання англійської мови є використання рольової гри, яка дає змогу. висунути на перший план оволодіння студентами мовленнєвою діяльністю. Рольова гра допомагає реалізувати основити методичний принцип - комунікативної спрямованості навчання. Вона сприяє підвищенню у студентів мотивації вивчення іноземної мови, дозволіє враховувати їх психолого-вікові особливості, інтереси і нахили, сферу їхньої діяльності, моделюючи ситуації реального спілкуванню.

Рольові ігри розроблені в межах тематики і лексико-граматичного матеріалу, передбачених програмою для спеціальності «Водопостачання, водовідведення, раціональне використання і охорона водних ресурсів».

Методичні вказівки з польових ігор складаються із 7 розділів. На початку кожного розділу задається ситуація. Розділи вміщують певну кількість рольових карток, на яких подається інформація для обговорення. До кожного розділу додається термінологічний словник. Методичні вказівки вміщують також список реплік, що використовуються в діалогах.

Some formulas of communication - Деякі формули спілкування

Asking for information Пошук інформації

My question is the following - У мене наступне запитання

I would like to ask one question in this connection - Я хотів поставити одне запитання у зв'язку з цим

I would like at this point to ask a question concerning - Я хотів би поставити запитання, що стосується _____

May I address a question to Prof. _____? Чи можу я адресувати запитання проф., _____

Making contribution to the discussion - Внесок до дискусії

I should like to add in connection with - Я хотів би додати у цьому зв'язку

In addition I would like to mention - Крім того, я хотів би зазначити

In this context I would add that - у цьому контексті я додаю би

Agreeing/disagreeing Згода, незгода

I'm quite of your opinion - Я цілком з вами погоджуюсь

I fully agree with Prof. _____ Я повністю погоджуюсь з Проф. _____

I agree that is possible, but _____ Я погоджуюсь, це можливе, проте _____

I object to _____ Я заперечую проти _____

It is out of question - про це не може бути й мови

Expressing surprise/uncertainty - Здивування, непевненість

I was struck by seeing one of the papers - Я був вражений,

побачивши одну з статей

I am surprised that it is possible - Я здивований, що це можливо

It seems unlikely that - Здається мало ймовірно, що

I have doubts about the - Я маю сумніви відносно

I am not sure that you are right - Я не певен, що ви праві

Calling attention - Звертати увагу

I want to point out that - Я хочу вказати, що

I should like to stress the importance of - Я хотів підкреслити значення

I would like to draw your attention to - Я хотів би привернути вашу увагу до

Advising Порада

May I suggest that you try the ____? Чи можу я запропонувати, щоб ви спробували
Another possibility would be - Інша можливість була б
Have you thought about the ____? Чи думали ви про ____

Making assessment Оцінка

Your points are well-taken - Ваші аргументи досить переконливі

The paper raises an important question of ____ Стаття піднімає важливе питання

Your report demonstrates how important it is to ____ Ваша відповідь демонструє

Returning to the subject Повернення до теми

Let's come back to our topic – Давайте повернемося до нашої

теми

I would like to come back to the point raised by ____ Я хотів би повернутись до питання піднятого _____

Starting a conversation Початок розмови

To my knowledge – Наскільки я знаю

As far as I know -//-

What I had in mind in this context is that – Що я мав а увазі в цьому контексті це те що _____

Actually we don't know – Фактично ми не знаємо _____

I am sorry I cannot answer this offhand – На жаль, я не можу відповідати на це відразу _____

Today we are going to talk about ____ Сьогодні ми збираємось говорити про _____

Explaining the purpose of the meeting Пояснення мети засідання (зборів)

The purpose of today's meeting is to reach a decision on _____ (to work out a plan for ____). Мета сьогоднішніх зборів – прийняти рішення відносно (розробити план _____)

The subject for today's meeting is ____ Тема сьогоднішніх зборів _____

On the agenda today is ____ Сьогодні на порядку денному _____

Asking for details/clarification – Прохання детальніше пояснити

Could you be more specific about ____? Чи не могли б ви детальніше пояснити _____?

I don't follow your ____? Чи маєте ви на увазі _____?

I'm not clear about ____ Мені неясно _____

Delaying an answer – Зволікання з відповіддю

Well, let me see ____ Дайте подумати ____

That's a good question – Це добре запитання.

I'm glad you asked that question. – Я радий, що ви поставили це запитання ____

I'm not sure but ____ Я не певен, але ____

It is difficult to give exact answer ____, but ____ Важко точно відповідсти ____, але ____

Role play I. Hydrologic cycle.

You are a reporter for the newspaper. Discuss with the head of the committee for environmental protection elements of hydrologic cycle.

Discussion strategies. Determine processes in the water cycle. Explain how rainfall becomes groundwater. Discuss how clouds are important parts of Earth's cycle. Predict the effect of humidity on the condensation of water vapour from the air. Think in which area you would expect the greater evaporation rate. Discuss transpiration. Discuss the role of evaporation in the water cycle.

Role card I. Composition of the hydrosphere

The total volume of water in the hydrosphere amounts to nearly 1,500 million cubic kilometers. The world ocean accounts for almost 94 per cent of the total, and the water of the world's land area for 88,320,000 cubic kilometers, or some six per cent. Fresh water, including roughly 8,000,000 cubic kilometers of underground water, amounts to about 32,200,000 cubic kilometers, only a little more than two per cent of the hydrosphere,

Earth's hydrosphere contains the same water it did when the planet formed over 4,5 billion years ago. The water has merely changed its state numerous times during Earth's long history via a

continuous pattern of change called the water cycle.

Water is a vital, nonrenewable resource and must be used over and over again. In this respect it is reusable.

Role card 2. The hydrologic cycle

The hydrologic cycle links up all parts of the hydrosphere – the seas, lakes and streams, groundwater, soil moisture, atmospheric vapour – into a single whole. Energy from the sun drives the water cycle.

Water evaporating from the surface of the seas and land enters the atmosphere in the form of vapour, which later condenses and produces rain or snow. Part of the rain and melted snow seeps into the soil. The rest becomes what is called surface runoff, which flows into the rivers. Rivers are continuously fed by groundwater, whose reserves are renewed when soil moisture percolates downwards.

Part of the groundwater rises to the surface in the form of springs or is drained by rivers.

Lakes and rivers are replenished not only by precipitation, but also by river water.

Role card 3. Evaporation

Evaporation is the process whereby a liquid is changed to its gaseous state. Under certain conditions water evaporates from oceans very rapidly. In other situation, the evaporation rate is very slow. Warm temperatures, wind, large surface areas, and the energy of sun all increase the rate of evaporation, Shade, cool temperatures, high humidity, and small surface decrease the rate of evaporation.

Evaporation continuously replenishes the water vapour in the atmosphere. More than 86 per cent of the moisture that enters the atmosphere evaporates from the surface of the world ocean and

less than 14 per cent from the land areas. When more water molecules are escaping from the given volume of water than are being captured, evaporation is occurring. When more molecules are being captured than are escaping, condensation is taking place.

In August and September the ocean has been absorbing heat all through the summer and the water is probably at its highest temperature. More evaporation takes place, causing a build-up of moisture-laden air can fuel a hurricane.

Evaporation rates of Earth's ocean are controlled by insulation due to clouds, Earth's wind systems, and the relative humidity of the air that overlies the ocean. Water that evaporated from the surface of the ocean annually varies greatly with latitude. In the tropics, an amount of water evaporated every year equal to a layer of water 140 cm thick.

Like gases in Earth's atmosphere, water vapour is usually invisible, although it may be observed over a boiling pot as it condenses with the cooler air and becomes a liquid again.

Role card 4. Precipitation

Average precipitation is 760 millimetres on land and 1,140 millimetres on the seas. In the corresponding figures are 113,500 cubic kilometers (22 per cent) on land, 411,600 cubic kilometers (78 per cent) on the seas, and 525,100 cubic kilometres on the globe as a whole. Precipitation is rain, or if the air is cold enough, snow, sleet, or hail.

Role card 5. Soil moisture

The total volume of soil moisture is estimated at about 83,000 cubic kilometres. A number of features distinguish soil moisture from groundwater. First, soil moisture is much more closely connected with biological processes. Secondly, soil moisture is associated with weather to a greater degree than groundwater.

Infiltration enriches the soil with moisture during rains or snowmelt, but in the dry weater soil moisture quickly evaporates.

Soil moisture carries another important function by percolating deep inderground to recharge groundwater.

The soil not only influences the formation of groundwater but also the rate of stramflow and the regimen of rivers.

Role Card 6. Transpiration

In transpiration moisture is given off into the air by the surface of leaves and other parts of the plant. Transpiration is important in regulating the plant temperature. The world's average transpiration amounts to some 35,000 cubic kilometres a year.

A birch tree gives off the 268 litres of water a day, and corn gives about 37,000 litres per 0,5 hectare. If one tree gives off 260 litres of water a day, a forest of 1,000 trees would give off 260,000 litres in a day. A forest 10,000 trees would give off 2,600,000 litres. Over a growing season of eight months, a forest of 10,000 trees would take in and give off more than 460 million litres of water.

Words to be remembered

condensation – конденсація

cycle – цикл

drain – стікати, витікати

evaporate – Випаровуватись

fresh water – прісна вода

hail – град

humidity – волога

hydrosphere – гідросфера

infiltration – інфільтрація, проникнення

latitude – широта

leaf(leaves) – лист (листя)

liquid – рідина

melt – танути

percolate – проникати, просочуватись

precipitation – опад

reserves – резерви

seep – просочуватись

sleet – сніг з дощем, сльота

soil moisture – волога ґрунту

spring – джерело

state – стан

streamflow – струменева течія

surface runoff – поверхневий стік

underground(ground) water – ґрунтова вода

vapour – пара

Role play II. Types of water

You are students at the practical class in hydrology. Discuss with each other other types of water.

Discussion strategy. Think of the different forms water takes. Describe how water in a solid state differs from water in a liquid state. Determine which property of water makes it possible for an iceberg to float. Discuss how river water differs from seawater. Analyze if you can drink ocean water. Determine why it is easier to swim in the ocean than in fresh water. Think which element is most abundant in seawater not counting oxygen and hydrogen.

Role card 1. Classification of water

Natural waters are usually classified according to their origin. They include rain water, surface water, well water, spring water and sea water.

Role card 2. Rain water

Rain water occurs as rain, snow or hail. It is formed by condensation of water vapour in the air, It is the purest of all natural water,

The pores of spaces within rocks or soil trap rain water and form the water table.

Only about 25 per cent of rain drops from clouds reach land. The rest fall back into the oceans maintaining the balance between evaporating and condensation, and preventing oceans from becoming even saltier.

Generally, the world's most heavily populated areas receive enough rain for their needs.

These areas include most of Europe, southeast Asia, the eastern United States, India, China, and northwestern Asia. But about a half of Earth's land masses don't receive enough rain. These dry areas include most of Asia, central Australia, most of northern Africa, and the Middle East.

Role Card 3. Surface water

Surface water includes water from rivers, lakes, streams and glaciers. It is less pure than rain water. The volume of all surface waters of the land area, including glaciers amounts to about 25,000,000 cubic kilometres. This is 345 times less than the volume of the world ocean.

Role Card 4. Well water

Well water is derived from wells or bore holes. Wells may be shallow and deep. Shallow wells serve as a source of domestic water. Water from deep wells, especially from artesian wells, is the purest form of well water.

Role Card 5. Spring water

Spring water, or mineral water usually contains concentrated amounts of mineral salts. It usually includes carbonated, sulfides, sulfates, chlorides and silicates. Spring water frequently possesses medical properties.

Role card 6. Sea water

Sea water is the water which forms oceans. The seas cover 361,000,000 square kilometres or 70.8 per cent of the earth's surface. With an average depths of 3,800 metres the world ocean has a total volume of 1,370 million cubic kilometres. It receives impure water from rivers and streams. Sea water loses pure water by evaporation. The remaining impurities give sea water its saline character. Average salinity of sea water is 3,5 per cent.

The salts in sea water are mostly chlorides (88,7 per cent). Next come sulphates (10,8 per cent) and carbonates (0,3 per cent). Salt water from the ocean can creep into the underground water supply and make it unusable by humans.

The average salinity for the world ocean is 3,47 per cent, which means that 3,47 grams of dissolved solids are in each 100 grams of ocean water.

Density of seawater in the open ocean ranges from about 1,024 to 1,030 gm/cm³ at the surface. The density of ocean water increases with decrease on temperature or an increase in salinity. Water makes up about 96,5 percent of ocean's mass.

The chemicals in seawater are present in about the same proportions as they are in the body fluids of humans and animals' Many scientist use fact to argue that life began in the sea.

Role card 7. Underground (ground) water

The total amount of groundwater in the zone of active exchange

is approximately 4,000,000 cubic kilometres. The chemicals composition of underground water ranges from pure fresh water to deep-lying, highly concentrated brine containing more than 250 grams of salt per litre of water. Sodium chloride water predominates.

Fresh ground water is water that flows beneath the surface through rocks and soil in the upper part of Earth's crust.

Natural drainage of groundwater plays a great role in the hydrologic cycle. It regulates the rivers by feeding them steadily. As groundwater flows through a porous medium to the site of intake it undergoes a measure of self-cleaning. The amount of groundwater in the zone of active exchange is approximately 4,000,000 cubic kilometres. The chemical composition of underground water ranges from pure water to deep lying concentrated brine containing more than 2590 grams of salt per litre of water. Sodium chloride water predominates.

Fresh groundwater lies chiefly in the zone of active water exchange, in the upper part of the earth's crust, which is drained by river valleys, lakes and seas.

Natural drainage of groundwater plays a great in the hydrologic cycle. It regulates the rivers by feeding then steadily.

As groundwater flows through a porous medium to the site of intake it undergoes a measure of self-cleaning.

The area filled with ground water is knows as the zone of saturation. The very top of the zone of saturation as called the water table.

Role card 8. States of water

Water exists in three states:: solid, liquid and steam, Water in a solid state or ice, melts at 0 degreed C. Liquid water freezes at -4 degrees C. Liquid water boils at 100 degreed C and becomes steam. Unlike nearly all other substances, water expands when it freezes. Thus, ice is less dense than liquid water and floats,

Earth is the only planet in our solar system on which water exists in all three states. Scientists hypothesize that is one reason life is so abundant on our planet.

Words to be remembered

artesian well – артезіанська свердловина

boil - хиліти

boro hole – свердловина

brine – розсіл, ропа, морська вода

carbonate – карбонат

crust – кора

density – густина, щільність

domestic water – побутова вода

drainage – дренаж, стік

earth's crust – земна кора

feed – жити, живлення

freeze – замерзати

glacier – льодовик, глетчер

hail – град

impure – брудний, нечистий, з домішками

impurities – домішки

intake – всмоктування, забір

liquid – рідина

medium – середовище

pore – пора

porous – пористий

pure – чистий

rock – порода

saline – солоний, сольовий, соляний

salinity – солоність

saturation – насичення

self-cleaning – самоочищення

silicate – силікат

sodium chloride – хлорид натрію

soil – тверда речовина

spring – джерело

steam – пара

sulfate – сульфат

sulfide – сульфід

water exchange – водний обмін

water table – водний рівень

well -свердловина, колодязь

Role play III. Water resources

You are a participant at the scientific conference. Discuss problems of water resources with a TV commentator.

Discussion strategies: Comment on some sources of water of Earth. Discuss uses of water. Describe the total annual flow of rivers. Analyze stramflow of continents. Determine the role of lakes and reservoirs. Think what will happen if ice on earth melts.

Role card 1. Water resources in general

Water resources include the rivers, lakes, canals, reservoirs, swamps, groundwater, soil moisture, mountain and polar glaciers the seas and oceans, the atmospheric wayer.

People remove water from underground storage, lakes and rivers to use for drinking, bathing, washing, manufacturing and to grow crops. In some areas, people remove water from the ocean in desalination plants to get fresh water.

Role card 2. Rivers

Rivers return to the seas the water which the atmosphere carries from the seas to dry land in the from of vapour. Rivers are fed by surface runoff and groundwater discharge. Total annual flow of all the rivers of the world, including polar glacial flow, is 41,730 cubic kilometres.

Each year the rivers of the world combined carry 18 billion metric tones of land to the oceans.

Role card 3. Streamflow

Asia has more streamflow than any other continent (32 per cent of the world total), followed by South America (25 per cent), North America (14 per cent), Africa (10 per cent), Europe (7,5 per cent) and Australia (one per cent).

Role card 4. Glaciers

Glaciers cover more than 16,000,000 square kilometres, almost 11 per cent of the land area, and contain about 24,000,000 cubic kilometres of water. If all ice on earth were to melt, the level of the seas would rise by 64 metres and their area would increase by almost 1,500,000 square kilometres, reducing the land area by one per cent.

Three quarters of the Earth's fresh water is in glaciers. Icebergs are parts of glaciers that break off and drift in the sea, As a source of water, an iceberg would probably be good. However the biggest problem would be getting the iceberg where it could be used. Most places that need water are far away from the poles and have warm climates where the iceberg would melt.

If glaciers, ice caps and icebergs suddenly melted, sea level would rise about 60 meters around the world. Vast coastal areas would vanish underwater, including major cities like New York, London, and Tokyo.

Role card 5. Lakes

Lakes and rivers are inseparably linked up within the hydrologic cycle. Very few lakes are indepent of rivers, rivers usually flor into, from or through them. A characteristic feature of lakes is that

more water is evaporated from their surface than from the surrounding land. The main role takes play in the hydrologic cycle consists in regulating streamflow, making it more even during the year.

Role card 6. Storage reservoirs

There are now about 1,350 reservoirs in the world with a capacity of more than 100,000,000 cubic metres each. A significant share of the world's reservoirs is used primarily to produce hydroelectric power to detriment of fishing, farming, flood control, etc.

Reservoirs should be used, first and foremost for public water supply, irrigation, farming, fishing, recreation. Reservoirs should occupy a minimum area, with dikes built to protect most valuable land.

Words to be remembered

swamp – болото

canal – канал

polar glacier – полярний льодовик

discharge – витікання, спуск

flow – потік, течія

streamflow – струменевий потік

storage reservoirs – водосховище

flood – повінь, затопляти, виходити з берегів

water supply – водопостачання

recreation – розвага, відпочинок

desalination plant – опріснювальна установка

dike – гребля

ice cap – льодова шапка

Role Play IV. Water Consumption

You are a graduate from the faculty of town planning and

dedevelopment. Discuss with the manager of the American firm problems of water consumption.

Discussion strategies: Determine how you can conserve water when you take a shower. Discuss some ways in which people use water. Think about how you depend on water for your daily activities. Determine if water helps regulate body temperature.

Role card 1. Water consumption in the USA

The family of four uses 5-7 gallons to flush a toilet one time, 3-5 gallons to brush teeth, 40-70 gallons to make a ten-minute shower and 10-20 gallons to wash the dishes.

We need water to digest food, eliminate waste and regulate water temperature.

Role card 2. Water consumption in the USA (continued)

To wash the car for 20 minutes (with the nozzle off and hose running the whole time) they use 90 gallons. When a leaky faucet drips slowly for a month 300 gallons of water are wasted, when the toilet leaks for 6 months 45,000 gallons of water are wasted. To wash clothes in a laundering machine requires 30-5 gallons of water.

It was estimated that in 1988 38 million Americans were exposed to unsafe water from city water supplies. Unsafe water was also found in rural area wells in 38 states.

Role card 3. Water consumption in the world.

One person needs from two and a half to three litres of water a day, or about one cubic metre a year for drinking and cooking. With the population of the world now at 3,600 million, the total requirements for these purposes come to 3,5 cubic kilometres annually. 200 litres a day is enough to meet a person's domestic requirements. The food industry and trade network need about 100 litres a day per head of the population. About 100 litres per person goes to sprinkle the streets and to water foliage. The total is 400 litres a day per urban dweller.

The human body uses water to digest food, eliminate waste and regulate its temperature. Our body is about 85 percent water. We

can live without food for two months, but one can live without water for only a few days.

Role card 4. Water consumption in industry.

It takes about 250 cubic metres of water to produce one tonne of cotton fabric, one tonne of man-made fibre requires about 2,500 and 5,00 cubic metres. About 1,000 cubic metres is needed to produce one tonne of ammonia, and 2,00 cubic metres for one tone of synthetic rubber. 4,000 cubic metres of water is used to smelt one tone of nickel. It consumes 35 cubic metres to refine one tonne of crude oil. A total of about 400 cubic kilometres of water is now required annually by then industrial enterprises of the world.

Words to be remembered

cotton fabric – бавовняна тканина

crude oil – сира нафта

drip – капати, падати краплями

faucet – вентиль, водопровідний кран

fibre – волокно

flush a toilet – промивати туалет

foliage – листя

gallon – галон

hose – шланг

laundering – прання

leak – давати течу, протікати, просочуватись

leaky – що протікає

man-made – штучний

nozzle – насадка, сопло

refine – очищувати

rubber – гума

smelt – виплавляти

sprinkle streets – поливати вулиці

take a shower – Приймати душ

urban weller – мешканець міста

Role play V. Water supply system

You are teacher at the examination in water supply and sewerage. Put a questions to a student being examined.

Discussion strategis: Discuss how water is polluted. Determine how water can be cleaned. Determine what happens to water flowind through contaminated sediment. Think why water in rivers, lakes and reservoirs isn't clean. Explain what would make a better filter, gravel of sand.

Role card 1. Types of water supply systems

Water supply systems vary widely in purpose and in quality of water required. In a direct flow system the entire supply is drawn from a stream, lake, reservoir or groundwater basin and requires more water. In a recycling system the user draws only as much warer from the source as he needs to replace the amoun lost in the process of production.

Earth has been called the water planet because water is so abundant. It it constantly being renewed through the water cycle by evaporation, condensation and rainfall. However, the once abundant supply of fresh water is being depleted because of the activities of people. It is everyone's responsibility to protect, conserve and use Earth's water wisely.

Role card 2. Elements of water supply system

A water-supply system usually consists of a source of supply, a reservoir and pipe line, a treatment plant, and a distribution system of pipes. A pipe line or a conduit conveys the water from the source of supply to the community.

Role card 3. Types of treatment

A treatment plant removes impurities from the water to make it suitable for use. There may be preliminary, primary, secondary and auxiliary treatment. During primary treatment the larger and heavier solid particles settle out. Secondary treatment deals with decomposable materials. Auxiliary treatment is the disinfection or the killing of the bacteria by means of chemicals.

Water is usually treated with potassium and aluminium salts to make the sediment in the water stick together and heavy enough to sink to the bottom of the water tank. Next, the water flows through layers of fine, clean sand, which filters out most small solids.

Sand is a much more effective filter than graver. Graver is unable to trap the smaller particles that sand on.

Sometimes air is sent bubbling through the water to improve the colour and taste. To make sure no bacteria can survive in it, chlorine is added. Most cities also add fluoride which prevents cavities in teeth.

Role card 4. Closed cycle operation

Industrial plants must build recycling installations. Closed cycle operation has a number of advantages. First, it stops the discharge of industrial effluents into the waterways. Second, the plant can treat its wastes more cheaply and thoroughly. Besides, it can modify its production process to prevent unnecessary pollution of water it uses.

Role card 5. Sewage

Urban and rural water supply systems produce about 65 cubic kilometres of sewage of which about 60 cubic kilometres is discharged into streams and something like five cubic kilometres into the sea. Between 650 and 760 cubic kilometres of clean river water is needed annually to purify all urban and rural sewage. One

cubic metre of untreaded sewage spoils between 40 and 60 cubic metres of naturally pure water. Even the most up-to-date treatment methods do not clean water completely.

Water pollution is a large-scale problem. What are some sources of pollution. Raw sewage pumped into rivers, lakes, and oceans pollutes many city water supplies. Fertilizers, pesticides, and insecticides that leach into groundwater supplies are common in farming regions. Liquid wastes from large manufacturing plants pumped into bodies of water, materials leached from landfills and careless disposal of hazardous wastes are other common sources of water pollution.

Antipollution efforts on the 1960s and 1970s in the United States resulted in declines in the levels of many toxic or poisonous substances in Lake Erie and other Great Lakes. The Cuyahoga river in Cleveland, Ohio, was so polluted in summer of 1969 that the river caught fire and burned as a result of chemicals in the water. The Great Lakes are now cleaner than they have been in the years past. Some of the beaches have reopened and untreated sewage no longer flows into lakes causing high levels of bacteria.

Words to be remembered

auxiliary treatment – додаткове очищення

basin – басейн

body of water – водоймище

bubble – бульбашка, братися бульбашками

cavity – порожнина

chloride – хлор

closed cycle operation – безстічна робота

community – громада, суспільства

conduit – трубопровід, акведук

decomposable – той, що розкладається, гниє

direct flow system – прямопотічна система

discharge – викид, витікання, спуск

disinfection – дезинфекція

distribution system – розподільна система
effluent – стік, витік
fertilizer – добриво
fluoride – фтор
gravel – гравій
impurities – домішки
insecticide – Інсектицид
landfill – звалище відходів
layer – шар
leach – вилуговувати
pesticide – пестицид
pipe line – трубопровід
pollution – забруднення
potassium – калій
preliminary treatment – попереднє очищення
primary treatment – первинне очищення
purify – очищати
raw sewage – необроблені стічні води
recycling installation – установка повторного використання
recycling system – система повторного використання .
rural water supply system – система сільськогосподарського постачання
secondary treatment – вторинне очищення
sediment – осадовий
sewage – стічні води
solid particle – тверда частка
store – запасати, зберігати
trap - затримувати
treat – обробляти
treatment plant – очисна споруда
up-to-date – сучасний
user – користувач
waste – відходи
water supply – водопостачання

Role play VI. Pollutants in Pennsylvania

You are a visiting lecturer from Ukraine specializing in ecology. Discuss with an American colleague water pollutants in Pennsylvania.

Discussing strategies: Discuss the American water legislation. Determine inorganic contaminants. Examine chemicals in farming. Comment on volatile organic chemicals.

Role card 1. Water legislation

In 1972 the Clean Water Act was adopted. In 1975 Congress passed the Safe Drinking Water Act. This act authorized the Environmental Protection Agency to set up national drinking water regulations. Amendments to the federal Safe Drinking Water Act in 1986 required an increase in the number of contaminants to be monitored.

Role card 2. Inorganic Contaminants

Inorganic contaminants primarily consist of metals. These metals could be naturally occurring in some sources of supply. Chemicals such as chorium or selehium are not occurring in Pennsylvania. Asbestos can be present in the lining of water mains.

Role Card 3. Chemicals in farming

Nitrates can be present in steams or wells if farming fields re overfertilized. If pesticidcs are improperly disposed of or misused, they can be present in rivers, streams, reservoirs, lakes, wells or springs.

Role Card 4 Volatile organic chemicals

Volatile organic chemicals are used in dry-cleaning and in industries using petroleum products. These compounds easily evaporate into the air. They can travel through the soil and enter the groundwater, the underground reservoir of water, wells and springs.

act – закон

chromium – хром

compound – сполука

contaminant – забруднююча речовина

dispose of – усувати, видаляти

drinking water – питна вода

dry-cleaning – суха чистка

environmental protection agency – агентство по захвату
довкілля

farming – сільське господарство

groundwater table – рівень ґрунтових вод

line – облицьовувати

nitrate – нітрат

overfertilize – занадто удобрити

pesticide – пестицид

petroleum – нафта, гас

pollutant - забруднювач-

safe drinking water – надійна питна вода

selenium – селеній

volatile – летючий, леткий

water legislation – водне законодавство

water main – магістральний водопровід

Role Play VII. Water Resources of Rivne Province

You are a reporter from Canada. Ask a Canadian scientist who visited the Rivne province about water resources in the province.

Discussion strategies: Comment on water level in Rivne province rivers. Discuss tributaries of the Ustya river. Determine main pollutants of the Ustyn river. Examine lakes and reservoirs in Rivne province Think if reserves of ground water in Rivne province are sufficient.

Role Card 1. Rivers

There are 170 rivers in the region the total length of which is about 4,5 thousand km. They all belong to the basin of the Prypyat river, the right tributary to the Dnipro. The largest rivers of the region are the Styr with the Ikva and the Goryn with the Sluch. They are main arteries of the surface run-off. The Goryn length in Rivne province is 386 km, of the Styr - 208 km, of the Sluch - 153 km. of the Ikva - 93 km. The water level in rivers increases in spring and sometimes during summer and autumn rainfalls. The duration of high flood level is generally 60 days, but in 1928 it amounted to 125-130 days. The maximum river flood occurred in 1993. The water level in rivers increased by 3,5 m inundating 135 thousand ha of agricultural lands, destroying 4470 houses and 680 other buildings.

Role Card 2. The Ustya river

The Ustya river belongs to the Goryn river basin being its left tributary. It flows on territories of Rivne and Zdolbuniv districts. The river length is 66 km, Its outlet being located at 2 km distance

from the village Ustensko-11. The Ustya river has 2 left tributaries (Spasiv and Kunin) and one right tributary (the Bezodnya spring), their total length being 56 km.

Role Card 3. The Ustya river (continued)

Major residential centres of the Ustya basin are Rivne, Zdolbuniv, Kvasyliv, Orzhiv, Klevan. Main sources polluting the Ustya river basin are industrial enterprises, automobile transport and non-controlled waste dumps. Among pollutants special place belongs to elements with high stability, migration capability and toxicity, heavy metals being the most dangerous contaminants.

Role Card 4. The Ustya river (continued)

The largest content of heavy metals ions had been registered in the area of Rivne town railway agglomeration resulting from waste waters of the high voltage equipment plant and the railway area. The biggest content of lead in soils had been registered in the valley Kornin-Novy Dvir and also near the Gorodok village exceeding seven times background figures. The largest copper content has been observed in the area Rivne-Shpaniv. Heavy metals which pollute soils are being accumulated in plants. During their consumption as food in concentrations exceeding maximum allowable rates they cause disease of liver, blood, teeth, increase the number of still-born babies, result in genic mutations during the pregnancy period.

Role card 5. Lakes

There are 52 lakes with the total area of 266 sq.Km. and the water volume of 131 mln cub.m. All lakes are located in Polissya.

The largest lakes are Nobel (5 sq. km), Bile (2,5 sq. km), Ostrivske (1,12 sq. km). The deepest one is the Bile lake where depths of 27 metres had been observed. The lakes are of river and karst origin.

Role card 6. Reservoirs

In the beginning of 1994 there were 13 artificial water reservoirs in Rivne province with the total area of 37 sq. km. and the water volume of 72 mln cubic metres. The largest water bodies are Khrinnytske, Mlynivske, Novomalynske, Boberske. To this group of water bodies belong also 561 ponds with total area of 64 sq.km and their water volume exceeds 75 mln cubic metres.

Role card 7. Ground waters

Total reserves of ground waters are estimated at 3600 thousand cub.m. They are fed mainly on account of the infiltration of atmospheric precipitation. In chemical composition the most spread are hydrocarbon-calcium, chloride-sulphate and calcium magnesium waters.

Words to be remembered:

accumulate – накопичувати (сь)
artery – артерія
calcium – кальцій
composition – склад
content – вміст
copper – мідь
disease – хвороба
genic mutation – генні мутації
hydrocarbon – вуглеводень
inundate – затоплювати, zalивати
ion – іон

lead – свинець

magnium – магній

outlet – витік, стік, верхів'я

plant – рослина

pollute – забруднювати

pregnancy – вагітність

rainfall – злива, опади

residential centre – житловий центр

still-born babies – мертвонароджені діти

toxicity – токсичність

tributary – притока

waste dump – звалище відходів

TEXTS FOR ADDITIONAL READING

EVALUATION OF SOURCES

THE QUALITY OF WATER

Absolutely pure water is never found in nature. The impurities in water vary from dissolved gases and chemical compounds to suspended matter such as disease organisms and dirt. While some of these impurities can be seen by the naked eye and others can be detected by taste or odour, most can be detected only by laboratory test.

Water takes on various characteristics and properties as it passes over and through the earth. These characteristics and properties vary, are dependent on the materials encountered. They may be classified according to means of detection as physical (detected by one or more of the five senses) and chemical (detected by chemical analysis). The most important physical characteristics are turbidity, colour, odour, taste and temperature. The most important chemical characteristics are acidity, alkalinity, hardness and corrosiveness. Sometimes these two types of characteristics overlap; for example,

iron in water is a dissolved mineral detectable by chemical analysis, yet its colour and taste are also physical.

BACTERIOLOGICAL QUALITY

The selection of a source of supply may be restricted because of economic or technical limitations involved in the use of normal water treatment processes for making the water from this source safe for human consumption.

The effectiveness of a water treatment process cannot be established in specific, quantitative values. For instance, the bacteriological quality of filtered, chlorinated water is dependent upon the bacterial content of the raw water; its chlorine demand; the coagulating, settling and filtering characteristics of the treatment plant; the degree of uniformity of the raw water; and, not least, the integrity and ability of the treatment plant operator. Furthermore, the public health significance of the degree of bacterial pollution of raw water, and hence of any bacteria remaining in the treated water, depends upon the probable source of contamination of raw water with coliform organisms, which serve as an indicator of pollution. These organisms may have originated largely from surface drainage, a situation likely to be most noticeable when manured fields are found within the watershed involved. On the other hand, sewage pollution may be the chief source of such organisms, in which case the incidence of intestinal diseases among the population contributing the sewage would have a marked impact on the water. In this case the probable ratio between the numbers of pathogenic organisms and of coliform bacteria in the polluted water will be considerably increased. Such conditions are often encountered in rural as well as semi-urban areas where intestinal diseases constitute a serious public health problem, the treatment of the sewage is not practicable, and effective water treatment is beyond the economic and technical resources available.

CHEMICAL AND PHYSICAL QUALITY

Water of good chemical and physical quality is necessary from the points of view of its acceptability by the people, the protection of the health of the consumer, and the conservation of the water system. Anyone who has drunk water from different sources encountered situations in which offending chemical substances have made a water source unacceptable even though its bacteriological quality was excellent.

Palatability of water is a term which describes the characteristic of being pleasing to the sense of taste. Drinking water should be free from colour, turbidity, taste, and odour, and should be cool and aerated. At least four human perceptions can be used in judging these qualities. They are the senses of sight (colour and turbidity), taste, smell (odour), and touch (temperature). However, palatable water is not always safe to drink.

Turbidity and colour are important in rural water supplies. Depending upon the character of the watershed, turbidity may vary considerably from one season to another because of rainfall. A sudden increase in turbidity may do serious damage, or at least stop the operation, of small water treatment plants if adequate precautions are not taken in advance in order to allow for rejection of the incoming supplies at such times. Water from slow moving streams and small lakes is likely to be coloured, at least during certain seasons of the year. Both turbidity and colour will cause discolouration of clothes and may be responsible for rejection of the supply if removal by simple and economical processes cannot be achieved.

CORROSION AND SCALE

Hydrogen sulfide, dissolved oxygen, and carbon dioxide in water cause acidity and are responsible for corrosion of iron pipes. Hydrogen sulfide, which is sometimes found in deep well water, is

a product of decomposition of organic matter. It attacks cement and concrete and destroys storage tanks built of these materials. Dissolved oxygen combines with ferrous iron, which is sometimes found in solution in well water, and produces ferric hydroxide, which is insoluble and gives the water a rusty colour. It may cause serious corrosion of distribution pipes and house plumbing pipes.

Perhaps the most important and troublesome of the three products is carbon dioxide, which is often found in well water and in surface water drawn from heavily wooded watersheds or from the lower layers of deep ponds. Carbon dioxide in water is responsible for heavy and rapid corrosion of unprotected pipes, thus creating increasing difficulties in maintenance and operation of a water system. Various materials, mostly bituminous compounds and cement are used for lining the interior surfaces of pipes against corrosion. These materials are also used to protect outside pipe surfaces against corrosion caused by the contact of pipes with certain soils and, under certain circumstances, by electrolysis.

Natural water containing carbon dioxide will dissolve carbonates from rocks in the ground, thus producing soluble bicarbonates. Depending upon the relationships between the bicarbonate alkalinity and the pH of the water on the one hand, and between the free carbon dioxide and the alkalinity on the other, the water will either be corrosive or, on the contrary, will deposit a film of carbonate on the inner surface of pipes. This film may sometimes develop sufficiently to become a thick scale which obstructs small distribution and service pipes, water meters, etc. The prevention of corrosion and scale rests upon the chemical control and maintenance of the proper equilibrium between the three factors, i.e., by reducing the content of carbon dioxide or increasing the alkalinity as determined by special tests.

TURBIDITY

Turbidity is a muddy or unclear condition of water, caused by particles of sand, clay, or organic matter being held in suspension.

The faster water flows, the more materials it picks up and the larger the size of the pieces carried along. As water slows down, the larger particles settle out. Clay and silt remain suspended in water longest, because of their particles size and specific gravities.

COLOUR

Colour in water is due to the presence of coloured substances in solution such as vegetable matter dissolved from roots and leaves, and to humus and iron and manganese salts. True colour is due to substances in true solution; apparent colour includes true colour and also that due to substances in suspension. Water taken from swamps, weedy lakes, and streams containing vegetation is most likely to be coloured. Colour may also be caused by industrial wastes and turbidity. The latter is responsible for an apparent colour, rather than the true colour, and is caused by materials of vegetable origin. Colour as such is harmless, but objectionable due to its appearance and to the taste and odours sometimes associated with it.

ODOURS AND TASTE

Taste and odours found in water are mostly commonly caused by algae (minute water plants), decomposing organic matter, dissolved gases, or industrial waste. Mineral substances may also be a cause. Potability is not normally affected by the presence of odours and tastes. On the other hand, palatability is frequently affected, particularly when a substance such as bone or fish oil is present. Water containing one of these substances in noticeable quantities is unpalatable. Tastes and odours which make water unpalatable must be removed. Use of free available chlorine and activated carbon will do much to prevent odorous combinations of chlorine with organic impurities in water.

TEMPERATURE

Warm water tastes flat. Lowering the temperature of water suppresses odours and tastes and, therefore, increases its palatability. In summer the temperature of deep lakes and reservoirs decreases sharply from top to bottom. By shifting the depth of intake, it may be possible to draw relatively cool water even during hot weather. Water should be drawn from the lower depths when possible. Cool water is more viscous than warm water and thus is more difficult to coagulate and effectively chlorinate than warm water due to slower reactions. Water treatment times should be increased when water temperatures are less than 45 degrees F.

ACIDITY AND ALKALINITY

Some of the physical impurities cause water to behave as either an acid or a base. The degree of acid behaviour is called acidity. The degree of basic behaviour is called alkalinity. Since either condition has an important bearing on water treatment, the degree of acidity or of alkalinity must be determined. The pH value is a measure of the acidic or alkaline nature of the water. The pH value ranges from 0 – 14. A value of 7 is neutral. A high pH value indicates a very strong alkaline solution. The pH influences the corrosiveness of the water, the amount of chemical dosages necessary for proper disinfection, and the ability of an analyst to detect contaminants.

HARDNESS AND OTHER CHARACTERISTICS DUE TO DISSOLVED MINERALS

Hardness is caused by the soluble salts of calcium, magnesium, iron, manganese, sodium, sulfates, chlorides, and nitrates. The

degree of hardness depends on the type and on the amount of impurities present in the water. Hardness also depends on the amount of carbon dioxide. The hardness caused by carbonates and bicarbonates is called carbonate hardness. The hardness caused by all others (chlorides, sulfates, nitrates) is called non-carbonate hardness. Alkalinity is usually equivalent to the carbonate hardness. Sodium, however, also causes alkalinity. In natural waters, sodium is not normally present in appreciable amounts. Therefore, in natural waters, the alkalinity is equal to the carbonate hardness. After a water has been softened, however, a large amount of sodium remains in the treated water. . In softened water, the total alkalinity is the sum of the carbonate alkalinity plus the sodium alkalinity. Hardness is undesirable in that it contains soap, makes water less satisfactory for cooking, and produces scale in boilers and distillation units

FACTORS INFLUENCING THE QUALITY OF WATER

As water goes through its hydrologic cycle, it gathers numerous impurities. Dust, smoke, and gases fill the air and tend to contaminate rain, snow, hail, and sleet. As runoff, water picks up silt, chemicals, and disease organisms. As it enters the earth through seepage and infiltration, some of the suspended impurities may be filtered out, but at the same time, other minerals and chemicals are dissolved and carried along. It is now ground water in an underground deposit and, although it may now become less contaminated or polluted, it is not necessarily pure, and may contain disease organisms as well as harmful chemicals. In addition to the impurities in water resulting from infiltration, many are contributed by an industrialized society. Garbage, sewage, industrial waste, insect sprays, and chemical, biological, and radiological agents are examples of these. Impurities in water are either suspended or dissolved. The suspended impurities are more dangerous to health. They include mineral matter, disease

organisms, silt, bacteria, and algae, and must be destroyed or removed from water that is to be consumed.

The main factors influencing the quality of a given water supply source are:

- A) Nature of the surface geology; character of soils and rocks.
- B) B) Character of vegetation; forests; cultivated and irrigated lands, including salinity, effect on irrigation water, etc.
- C) Methods of sewage disposal whether by diversion from watershed or by treatment.
- D) Character and efficiency of sewage treatment works on watershed.
- E) Proximity of sources of faecal pollution to intake of water supply.

THE QUANTITY OF WATER

Surface water originates mostly from rainfall and is a mixture of surface runoff and ground water. It includes large rivers, ponds and lakes, and the small upland streams which may originate from springs and collect the runoff from watersheds. The quantity of runoff depends upon a large number of factors, the most important of which are the amount and intensity of rainfall, the climate and vegetation and, also, the geological, geographical, and topographical features of the area under consideration. It varies widely, from about 20% in arid and sandy areas where the rainfall is heavy. Of the remaining portion of the rainfall, some of the water percolates into the ground, and the rest is lost by evaporation, transpiration and absorption.

FACTORS INFLUENCING THE QUANTITY OF WATER

- A) Total annual precipitation.

B) Seasonal distribution of precipitation. Both the total annual precipitation and the seasonal distribution of precipitation are best determined by past record.

C) Soil porosity and permeability.

D) Annual and monthly evaporation and transpiration.

One of the first steps in the selection of a suitable water supply source is determining the demand which will be placed on it. The essential elements of water demand include the average daily water consumption and the peak rate of demand. The average daily water consumption must be estimated:

1. To determine the ability of the water source to meet continuing demands over critical periods, when surface flows are low, and ground water tables are at minimum elevations.

2.. For purposes of estimating quantities of stored water which would sustain demands during these critical periods.

The peak demand rates must be estimated in order to determine plumbing and pipe sizing, pressure losses, and storage requirements necessary to supply sufficient water during periods of peak water demand.

TYPES OF SOURCES

SURFACE WATERS

Lakes and ponds

A lake or pond is any standing body of inland water.

Quantity: Advantageous in that it is usually able to store water in wet periods for use in dry periods.

Quality: Generally poor. Normally turbidity and bacteria are main pollutants. Use only when ground water sources and controlled catchments are not available or are insufficient or inadequate.

Development requirements: The ideal situation is that the watershed permits water of the highest quality to enter the pond. To approach this goal, the watershed should be clean, free from

septic tanks, barns, privies, etc., protected against erosion and drainage from livestock areas, and livestock should be excluded (fencing if necessary).

Treatment requirements: No lake or pond water can be considered safe until it has been disinfected. Generally it is also necessary to remove turbidity.

Treatment processes:

1) Sedimentation plant – (w/o alum for coagulation) allows large particles of turbidity to settle out.

2) Filtration to remove turbidity and reduce bacterial content.

3) Disinfection

Warning: Lake and pond waters usually require extensive treatment and a floating intake structure. In many cases the filtration unit becomes clogged and must be cleaned. It is advisable to look elsewhere for a source of water.

Lakes and rivers

General: A stream or river is a body of running water on the surface of the earth, from higher to lower ground.

Quantity: Field controlled by minimum flow per day and year. Streams generally exhibit marked seasonal variation in flow.

Quality: Generally poor. Chemical nature partially dependent on bedrock. Physical and bacteriological quality highly variable. Easily contaminated. Impossible to exert sanitary control over watershed.

Development requirements: Requires a submerged intake structure and in the case of small streams requires the construction of small diversion dams.

Treatment requirements: Same as lakes and ponds. Likely to be more turbid and have a greater quantity of chemical pollutants.

Treatment processes: Same as the lakes and ponds.

Warning: Rivers and streams should be considered last as a potential source of water unless, of course, adequate treatment facilities already exist.

Springs

General: The outflow of water that has previously run or percolated through the pores of rocks. Two types:

1. Gravity ground water flows over impervious stratum onto ground surface.

2. Artesian water rises to surface after confinement between two impervious beds.

Quantity: Yield of gravity springs fluctuates with rainfall. Characteristically have low discharge. (2) Artesian springs tend to have a nearly constant yield.

Quality: Are subject to contamination near points of emergence. Poor to good. Usually contain dissolved minerals (especially calcium carbonate). Caution – springs emerging from limestone channels allow for very little natural filtration. May become highly turbid and polluted after heavy rains. Careful investigation recommended.

Development requirements: Elimination of all sources of contamination near point of emergence. If gravity type, further development not recommended. Requirements ... (1) filtration – sometimes not necessary (2) disinfection

Processes: (1) slow sand filter (2) chlorination

Catch Basins (Cisterns)

General: A sloping surface area for collection of rainfall runoff leading to a covered tank (cistern). Roofs are the most common collection areas.

Quantity: Dependent on amount and variation of rainfall, evaporation, infiltration, and replacement, and replacement of the soil deficit. For covered surfaces, losses are less than fifteen percent.

Quality: Wholly dependent on the character of the surface of the area of collection.

Development requirements: Construction of a watertight, manholed covered, tank with outlet.

Treatment requirements: Tank must be periodically disinfected. With fenced catch areas of clay surface, filtration advisable before intake. With roofs, cement or other hard surfaces it is advisable to have some screen to catch leaves, etc. Hard surfaces should be cleaned periodically.

Treatment processes: Disinfection is the only necessary treatment.

GROUND WATER

Ground water serves the great majority of people who live in rural areas and have a water supply system of one type or another. The reason is that, among the various sources of supply, ground water is by far the most practical and safe in nature. It is very probable that, for a long time to come, ground water will be the most important source of supply for most rural communities of the world.

The advantages of ground water are:

1. It is likely to be free of pathogenic bacteria;
2. Generally, it may be used without further treatment;
3. In many instances it can be found in the close vicinity of rural communities;
4. It is often most practical and economical to obtain and distribute;
5. The water bearing stratum from which it is drawn usually provides a natural storage at the point of intake.

The disadvantages are:

1. Ground water is often high in mineral content;
2. It usually requires pumping.

In ground water supply investigation and design, the engineer is concerned with the following steps:

1. to find it in the required quantity and quality as near as possible to the centre of consumption, in order to reduce transport costs;
2. to extract it by means of a system which produces the quantity required, safeguards the quality, and at the same time, involves the least capital outlay;
3. to transport the water to the consumer in a way which requires the least amount of operational and maintenance skill and cost.

Ground water is that portion of the atmospheric precipitation, mostly rainfall, which has percolated into the earth to form underground deposits called aquifers (water bearing formations). These can be tapped by various means; and, in the great majority of cases, they can be used without further treatment for individual and community water supplies in rural areas. The aquifer must be supplied with an ample quantity of water if it is to serve as a source. It is simply a reservoir and can be depleted in the same manner as a surface reservoir if its supply is inferior to the demand placed on it. In rural areas this is very seldom a concern as the aquifer will usually be replenished sufficiently to supply the relatively small demands of rural communities. An element of greater significance for the engineer searching for ground water pertains to the characteristics of the soil formation of the aquifer, i.e., to the ability of the aquifer to give up water and, therefore, to serve as a reliable source of supply.

The quantity of water that can be extracted from an aquifer will depend on (1) its porosity and permeability, and (2) the draw-down in the well. The porosity and the permeability, of a formation are limited by nature; and while conditions may be altered somewhat in the immediate vicinity of a well intake, the general nature of the aquifer is fixed and cannot be modified. The draw-down in a well, however, can be varied within the limits of the aquifer, the penetration of the well into the aquifer, and the capacity of the pump used.

Ground formations, however, have a certain tendency to hold the water and to give up only a part of it. This characteristic of a soil formation is called permeability; it is the quality of a formation which controls the passage of water through it. From a knowledge of hydraulics, it is obvious that water will pass through large openings more easily than it does through small ones.

Clays and topsoils have high porosity (large volumes of voids) but low permeability (very small opening between particles), so that water passes through them with great difficulty. Gravels and sands, on the other hand, are permeable and therefore allow ground water to pass with relative ease. This type of formation is also porous, so that it can store large quantities of water. These, then, are the water bearing formations most amenable to the development of wells and most important to the engineer in searching for a rural community water supply. Sandstone is both porous and pervious and therefore an excellent aquifer which can be tapped to produce large quantities of water, especially if it is confined.

Except for unusual geological features or underground dams, it can be said that, in any drainage basin, ground water always flows towards the principal streams. The best place to look for shallow ground water is at the bottom of draws and valleys. It is in this area that pockets of sand and gravel may have been deposited. If these are close to the present stream or in an old course, they will probably be well supplied. Underground sampling by boring or jetting in these areas will usually be profitable. In this way, samples of the underground formation can be taken and examined to determine the characteristics of the aquifer and its ability to supply the quantity of water needed.

SELECTION OF THE SOURCE OF SUPPLY

The choice of a source of supply for development depends on a number of factors, chief among which are: - the quantity and quality of the water available; the possibilities of sanitary control

of the catchment area; whether the water can be supplied to the consumers by gravity or has to be pumped; and the distance from the source to houses. In order to obtain full information on these points it is necessary to carry out a very careful preliminary survey.

SOURCE AND TREATMENT

In the final selection of a source the following priorities should be adopted.

First priority consideration

Water which requires no treatment to meet bacteriological, physical, and chemical requirements and which can be delivered to the consumer by a gravity system should be given first consideration. This would usually be limited to springs and protected drainage areas. Such a system requires no treatment and no pumping and, therefore, is ideal from the point of view of maintenance, which is thus reduced to an absolute minimum.

Second priority consideration

Water which requires no treatment to meet bacteriological, physical, and chemical requirements but which must be pumped to consumers, would be the second choice. Well supplies would fall within this category. Pumping can be an economical and simple solution, but it can also be an expensive and complicated one, according to local circumstances.

Third priority consideration

Water which requires simple treatment before it can meet bacteriological, physical, or chemical requirements but which can be delivered to the consumer through a gravity system should be given third priority consideration. Simple treatment is considered to be limited to: (1) storage which would provide plain sedimentation and some reduction in bacteria, (2) chlorination without the use of a mechanically operated chlorinator, (3) slow sand filtration; or a combination of these.

Fourth priority consideration

Water which requires simple treatment and which must be delivered to the consumers by pumping would obviously be the most expensive choice to make.

WATER TREATMENT

SELF PURIFICATION

Under favourable conditions, any polluted body of surface water – stream or river, lake or pond – will rid itself of a certain amount of its pollution by means of natural processes. This self-purification cannot be depended upon to bring about complete purification, but it may well improve the water quality sufficiently to ease the load on mechanical purification equipment.

STREAMS AND RIVERS

When sewage is discharged into water, a succession of changes in water quality takes place. If the sewage is emptied into a lake in which currents about the outfall are sluggish and shift their direction with the wind, the changes occur in close proximity to each other and, as a result, the pattern of changes is not crisply distinguished. If, on the hand, the water moves steadily away from the outfall, as in a stream, the successive changes occur in different river reaches and establish a profile of pollution which is well defined. However, in most streams, this pattern is by no means static. It shifts longitudinally along the stream and is modified in intensity with changes in season and hydrography.

When a single large charge of sewage is poured into a clean stream, the water becomes turbid, sunlight is shut out of the depths, and green plants, which by photosynthesis remove carbon dioxide from the water and release oxygen to it, die off. Depending on the stream velocity, the water soon turns nearly black. Odourous sulfur compounds are formed and solids settle to the bottom, forming a

sludge. The settled solids soon decompose, forming gases such as ammonia, carbon dioxide, and methane or marsh gas. Scavenging organisms increase in number until they match the food supply. The oxygen resources are drawn upon heavily and, when overloaded, become exhausted. Life in such waters is confined to anaerobic bacteria (which exist when no oxygen is available), larvae of certain insects such as mosquitoes, and a few worms. There are no fish; turtles are generally the only forms of higher life present. This condition is known as the zone of degradation.

In a second zone, or zone of decomposition, more solids settle out, the water becomes somewhat clearer, and sunlight penetrates the surface. Oxygen is absorbed from the atmosphere at the air-water interface permitting the establishment of aerobic (oxygen available) conditions. The aerobic bacteria continue the conversion of organic matter into nitrates, sulfates, and carbonates. These, together with the carbon dioxide produced by decomposition as well as by bacteria and plant life, are food sources. With sunlight now penetrating the water, and with abundant food, algae begin to flourish and form a green scum over the surface.

In the third zone, or zone of recovery, algae become more numerous and self-purification proceeds more rapidly. Green plants utilizing carbon dioxide and oxygen will liberate in the said time more oxygen than is consumed, thus hastening the recovery of the stream. Simultaneously, the fish that require little oxygen such as catfish and carp, are also found. As the dissolved oxygen increases, more types of fish appear. After recovery, in the zone of cleaner water, fish find the stream highly favourable, as the algae support various aquatic insects and other organisms on which fish feed. The water is clear or turbid according to concentration of algae, and may have odour for the same reason. Throughout the stages of recovery of self-purification, disease organisms are greatly reduced in number because they lack proper food, and experience unfavourable temperatures and pH values of water.

However, the water is still dangerous since all disease organisms have not perished.

LAKES AND PONDS

Self-purification in lakes and ponds is brought about by the same processes as in rivers and streams. However, currents are not as strong and sedimentation plays a larger role. Large deposits of sludge, dead algae, and organic material build up on the bottom. In deep lakes, self-purification is aided by seasonal “overturns”. This is simply an exchange of bottom water for surface water which occurs in spring and autumn, caused by the difference in the temperature of the water at the surface and bottom of deep lakes.

BASIC STEPS IN TREATING WATER

COAGULATION

Turbidity in water consists of finely divided negatively charged colloidal materials which are kept in suspension by mutual repulsion. Turbid water is difficult to clarify by filtration because these fine particles can cause rapid plugging or even pass through a filter. The agglomeration of these colloids into settleable or filterable aggregates through the action of certain chemicals is called coagulation. Iron and aluminum salts are the most widely used coagulants in water treatment plants.

SEDIMENTATION

Plain sedimentation is the natural settling of solids heavier than water without the addition of chemical coagulants. Solids heavier than water are held in suspension while in moving water, but gradually settle to the bottom as the water velocity is reduced. The time required to clarify water by sedimentation depends on the size

of the suspended particles and their specific gravity. Large and heavy particles settle in a few minutes once the water has become still, whereas very small particles such as clay and silt may remain in suspension for several days.

Plain sedimentation is not ordinarily used as a separate step in water treatment because the long period required for complete settling would call for an impractical number of settling tanks. However, in emergency situations, such as the necessity of taking water from a swift flowing stream which is heavily silt-laden after a rainstorm, special sedimentation tanks may be set up as a first step. This initial removal of turbidity reduces the load on the coagulation and filtration steps of the water treatment processes, and the frequency of filter backwashing is reduced

FILTRATION

Filtration consists of passing the water through some porous material to remove the suspended impurities. Filtration is one of the oldest and simplest procedures known to man for revolving suspended matter from water and other fluids.

The simplest form of water filter is the sand filter. This filter resembles a small reservoir, the bottom of which is a bed of filter sand which in turn rests on a bed of well-graded aggregate with the largest size aggregate being at the bottom. An underdrain system of tile or brick is provided under the gravel to collect the water from the filter area. The underdrain system consists of a header or main conduit extending across the filter bed. Means are provided for regulating the flow of water out of the filter through this header and also for controlling the rate of flow on to the filter. This allows the filter to be operated at controlled rates.

DISINFECTION

In addition to coagulation, sedimentation, and filtration, water must undergo an additional treatment step: disinfection. This is

necessary because no combination of the other three steps can be relied upon to remove all disease producing organisms, the pH and temperature of the water, the presence of interfering substances, and the degree of protection afforded organisms from the disinfecting solution by materials in which they are imbedded. Therefore, various concentrations of disinfectant are required depending upon the local environmental conditions and the amount of particle removal effected.

Chlorine is the most commonly used chemical for disinfection of water. It is employed in field water supply in the form of calcium hypochlorite, a standard item in the supply system. When the calcium hypochlorite is dissolved, the chlorine goes into solution and a calcium carbonate sludge settles out. The chlorine is present in the solution as hypochlorite acid or hypochlorite ion depending on the pH, both of which are powerful oxidizing substances. The chlorine available in either of these two forms rapidly oxidizes the organic and inorganic matter including the bacteria in the water. In this reaction the chlorine is converted to chloride and is no longer available as a disinfectant. The organic matter as well as such material as iron and manganese consume the chlorine. The use of chlorine makes it possible to introduce an accurately measured dosage to insure the destruction of disease producing organisms as well as provide a readily measured residual to safeguard against recontamination during further handling.

CHLORINATION FOR POLLUTED WATER

Chlorination when properly applied is a simple way to insure and protect the purity of water. The surest way to treat water for drinking is to boil it. However, under controlled conditions chlorination is a safe method, and more convenient and practical than boiling. Water properly treated has residual free chlorine which resists recontamination. The chlorine in water is not harmful since water with a harmful amount of chlorine in it is extremely

distasteful. When chlorine is added to water, it attacks and combines with any suspended organic matter as well as some minerals such as iron. There is always a certain amount of dead organic matter in water, and almost always live bacteria, virus, and perhaps other types of life. Enough chlorine must be added to oxidize all of the organic matter, dead or alive.

Some organisms are more resistant to chlorine than others. Two particularly resistant varieties are amebic cysts (which cause amebic dysentery) and the cercariae of schistosomes (which cause schistosomiasis). These, among others, require much higher levels of residual free chlorine and longer contact periods than usual to be safe. It always takes time for chlorine to work. Be sure that water is thoroughly mixed with an adequate dose of the dissolved chemical, and that it stands for at least 30 minutes before consumption.

THE SEPTIC TANK

THE FUNCTION OF SEPTIC TANK

When raw sewage enters the septic tank, it should be quiescent for a period of one to three days depending on the tank capacity. During this period the heavier solids, including grease and fat, remain in the tank and form the scum over the water surface, while the rest is carried away by effluent into the final disposal system. The solids which remain in a septic tank undergo anaerobic decomposition through the activity of bacteria and fungi. The significant result of this process is a considerable reduction in the volume of sludge, which allows the tank to operate for periods of one to four years or more, depending on circumstances, before it needs to be cleaned. This decomposition involves not only the sludge, but also the dissolved and colloidal organic contents of the sewage. In this manner the turbidity of the effluent is significantly reduced so that it may be more readily percolated into the subsoil of the ground. Thus, the most important function of a septic tank is to provide

protection for the absorption ability of the subsoil.

The three functions that take place in the tank, then, are:

Removal of solids

Clogging of soil with tank effluent varies directly with the amount of suspended solids in the liquid. As sewage from a building sewer enters a septic tank, its rate of flow is reduced so that larger solids sink to the bottom or rise to the surface. These solids are retained in the tank, and the clarified effluent is discharged.

Biological Treatment

Solids and liquid in the tank are subjected to decomposition by bacterial and natural processes. Bacteria present are of a variety called anaerobic which thrive in the absence of free oxygen. This decomposition or treatment of sewage under anaerobic conditions is termed “septic”, hence the name of the tank. Sewage which has been subjected to such treatment causes less clogging than untreated sewage containing the same amount of suspended solids.

Sludge and Scum Storage

Sludge is an accumulation of solids at the bottom of the tank, while scum is a partially submerged mat of floating solids that may form at the surface of the fluid in the tank. Sludge, and scum to a lesser degree, will be digested and compacted into a smaller volume. However, no matter how efficient the process is a residual of inert solid material will remain. Space must be provided in the tank to store this residue during the interval between cleanings; otherwise, sludge and scum will eventually be scoured from the tank and may clog the disposal field.

SOMETIMES THINGS GO WRONG IN YORKSHIRE

Water is available at your tap every hour of the day, 365 days a year, and it is treated so that it is safe for you to use. Occasionally things can go wrong.



DISCOLOURED WATER

There are several reasons that can cause discolouration of water supplies. The most common one is usually of a local nature, is where a burst has occurred. In some areas soft water has, over the years, reacted with the old cast iron mains causing a crust of rust-like deposits to form inside the pipe. When this deposit is disturbed, such as during repair work “dirty” water results. The other main cause of discolouration usually occurs over a wide area and peat is the culprit. The natural colour of much of upland reservoir water is brown. This is caused by peat staining which is picked up as the water runs off the peaty catchments grounds. During stormy conditions an unusually large amount of peat finds its way into the supply reservoirs increasing discoloration. Some of the older type treatment works do not have the facility to take out all the colour and peat stained water is passed into supply. Discoloured water may look unpleasant but it is perfectly harmless.

MILKY WATER

This problem usually occurs in areas where water is pumped under pressure. The ‘milk’ is simply millions of tiny air bubbles, and not lime as many people believe. The water is quite safe to drink.

LOSS OF SUPPLY

There are times when essential work has to be carried out on water mains and valves, and it is not always possible or practical, particularly where work is of a short duration, to warn customers. Where practicable 48 hours notice will be given. However, there are times when notice cannot be given, such as when a burst occurs and the water has to be turned off immediately to avoid wastage, flooding, damage to property and allow repairs to be carried out. Where supplies are cut off for any length of time and alternative

supplies are not available water tankers are provided where possible.

PIPE KNOCK OR 'HAMMER'

Can be a difficult problem as there are various causes. Some of the obvious ones are defective tap and ball valve washers, badly worn tap and ball valves, loose fitting pipes, especially in cold water pipes and high pressure

HOW GOOD IS YOUR DRINKING WATER?

Summary of the 1994 Report by the Drinking Water Inspectorate
Who supplies drinking water?

About 50 million people in England and Wales are supplied with 16,500 million litres of water daily by 31 water companies. This is about 99% of the population. Water is not the same everywhere because it comes from different sources such as rivers, reservoirs, lakes and streams and boreholes and wells.

To a varying extent, these sources contain different impurities which need to be removed. The water is always treated by disinfection, often by filtration and, sometimes, by more complex processes. There are about 1,600 treatment works. After treatment, drinking water is distributed through a network of pipes about 310,000 km long and some 5,000 tanks called service reservoirs or water towers. Each company's network is divided into water supply zones serving not more than 50,000 people. There are nearly 2,600 zones at all.

What are the standards?

The Government has set 55 standards for drinking water. Most of them come from an obligatory European Community Directive but some UK standards are more stringent. A few are based directly on World Health Organisation guidelines. The standards generally include wide safety margins. There are standards for:

- bacteria
- chemicals such as nitrate and pesticides
- the way water looks and tastes

Who monitors quality?

Water companies must, by law, take water samples and test them to check that quality standards are being met. They test for:

- bacteria at every treatment works and service reservoir and also at representative consumers' taps in each water supply zone, and
- chemicals and other measures at consumers' taps in each water supply zone.

Each water company has to keep a public record of all their test results. In 1994, in England and Wales, nearly 3.5 million tests were carried out.

Who checks on the water companies?

The Drinking Water Inspectorate checks whether the water companies carry out quality checks properly. We are a team of professionals with wide ranging experience and expert knowledge on all aspects of water supply. This includes chemistry, microbiology and engineering. On health matters, we are advised by the Government's Chief Medical Officer.

We inspect each water company every year to check that:

- sampling procedures are satisfactory
- samples are tested by trained staff using accurate methods
- the right numbers of tests are carried out
- the correct results are entered in the public record
- the appropriate water treatment processes are used
- the treatment processes and the water distribution system are operated and maintained satisfactorily.

We also examine each company's water quality test results for each treatment works, service reservoir and water supply zone and check them against the standards.

Bacteria

Bacteria in water are killed, usually by disinfection with chlorine. The most important standards are for bacteria called coliforms.

These are not harmful themselves but, if they are found in drinking water, they indicate that other harmful bacteria could be present. This could arise because of a problem at a treatment works or on the distribution system or, sometimes, because of dirt on a consumer's tap. All suspected identifications of coliforms are immediately investigated by the water company concerned and any defects in the system put right. Sometimes, all that may be needed is for the consumer's tap to be cleaned or repaired. No coliforms were detected in 99,8% of tests at treatment works in 1994 and in 99,7% of tests at service reservoirs. And 99,5% of water supply zones complied with the standard – a considerable improvement since 1990.

Pesticides

The standard for individual pesticides is very strict – one part in 10 billion. It was not met in 23,7% of zones in 1994, compared with 27,9% in 1993. The concentrations of pesticides found were extremely small and not at all likely to harm health. Water companies are installing additional treatment at affected works. These treatment measures also improve the appearance and taste of drinking water. In agreeing improvement programmes to deal with pesticides, we require water companies to complete the work quickly.

Lead

The standard for lead was not met in 19,8% of zones in 1994, compared with 25,6% in 1991. These failures happened because the water picked up lead from the pipework connected the main supply to some houses in the affected zones. The failures do not mean that all the water in the zones was affected. Most of this lead pipework belongs to the householder. If consumers replace their lead pipework, they can require the water company to replace the lead pipework for it is responsible. Grants may also be available from local authorities. Water companies have programmes to replace their lead pipework. They are also improving water

treatment to reduce the ability of water to take up lead in zones where lots of properties have lead pipework.

Appearance, taste and odour

There are standards for colour, turbidity (cloudiness), taste and odour. In 1994, the standard for turbidity was met in 96,4% of zones. For taste and odour it was met in 98,7% and 99,3% of zones respectively and for colours in 99,4% of zones. These results have got better since 1990 as a result of improvements made at treatment works.

Iron

The standard for iron is based on the effect it has on the appearance of water. It is the main cause of complaints about discoloured water. The standard for iron was not met in 24,1% of zones in 1994. These failures were intermittent and usually caused by corrosion of old iron mains. The iron concentrations are not harmful to health. Water companies are carrying out major programmes to replace and reline affected mains. These are long-term measures, taking up to 15 years to complete. The worst affected areas are being dealt with first. Some improvement has already taken place since 1990 when 29,6% of zones failed.

Polycyclic Aromatic Hydrocarbons

This is a group of substances present in coal tar. Until the 1970s, tar was used to line iron water mains to prevent rusting. The lining eventually breaks down and can lead to minute traces of PAH getting into drinking water. Some types of PAH may be harmful if present in large amounts. But the standard for PAH is very strict and ensures that a health hazard is most unlikely. The PAH standard was exceeded in 12% of zones in 1994, three times more than in 1990, largely due to developments in monitoring techniques. Water companies' programmes to replace and reline water mains will deal with these failures.

WATER CONSERVATION AT HOME

Do you know how much you use?

Toilet	19 gallons
Bathing/Hygiene	15 gallons
Laundry	8 gallons
Kitchen	7 gallons
Housekeeping	1 gallon
Avg. Individual use	TOTAL 50 gallons

Customers are often surprised at the quantity of water they use in a normal day's time. Although the figure can obviously vary depending upon each person's individual habits we normally figure that each person in a household uses approximately 50 gallons of water a day. But, in many cases this number is 100 gallons a day or more.

Let's put a stop to the #1 cause of unexpected high water bills! By far the number one reason for unusually high water bills is toilet leakage. Toilet tanks are notorious for hidden leaks and can waste hundreds of gallons of water a day undetected. So it's a good precaution to check for any toilet seepage every six months to avoid the unfortunate surprise of a water bill two to three times higher than your normal consumption. The two easy tests should alert you of any problem areas.

The Plunger. Drop a little food colouring or laundry bluing into the toilet tank water and wait approximately 15 minutes to see if the colouring shows up in the bowl. Do not flush the toilet during this 15 minute period. If the colour does appear in the bowl you probably have a leak at the plunger ball and may need some adjustment or replacement parts for a tight seal.

The Overflow. Shake some Talcum powder on top of the water level and see if it runs down the overflow tube. Again do not flush while doing the test. If the powder does quickly run into the overflow your water level is too high and should be lowered by adjusting the float ball rod.

The toilet is the largest volume water user in your home, accounting for approximately 40 percent of family's total usage.

THE BENEFITS OF THE FLUSH TOILET

The contamination of drinking water by human waste has long been an important health issue, and it still is a serious problem in many parts of the world today. Diseases spread because of the use of streams and rivers for both sewage and water supply, and through the contamination of wells by seepage from polluted rivers, cesspits and even graveyards. But in Britain, the problem was worsened by the growth of dense urban areas in Victorian times. The most devastating result came in the form of a series of cholera epidemics during the 19th century which killed tens of thousands of people.

Cholera was brought in by travellers from countries such as India, where it was endemic, and it was spread by water from sewage contaminated wells and streams. British cities were particularly at risk. For instance, as London grew in size, the river Thames continued to be used as a sewer. The filth in the river came from many sources, including factories and laundries, as well as human waste. Then in the summer of 1858 came "The Great Stink" when the Thames was so unbearably filthy and smelly that Parliament had to abandon its deliberations. Politicians knew they had to do something. Permission was given to Sir Joseph Bazalgette, the city's chief engineer, to build a sewer system that would keep human waste away from the river. He eventually built 82 miles of efficient sewers (most of them still in use) and improved life for millions of Londoners.

The first serious measures to deal with sanitation and water supply were introduced in the Public Health Act of 1875. By the end of the century, the life saving combination of flush toilets in the home, more public lavatories, good drains, effective treatment of waste and a clean water supply had made cholera a thing of the

past and transformed the quality of life in British towns and cities, as well as increasing people's hopes for a longer life. Today, well over a billion people worldwide are still waiting for the same healthy combination to be introduced in their countries.

The water closet and the flush toilet

Using running water to wash away human waste is an obvious solution to the problem of water contaminated by sewage, and various kinds of "water closet" have existed for hundreds of years (the Romans used latrines with toilet seats placed over running water). However, the modern flush toilet with a ballcock valve in the cistern and a water trap in the outlet came, like most technological advances, by evolution. It was in the 1880s that pottery firm Twyford's (their name is still to be seen on much public toilet porcelain) made the first one-piece modern ceramic toilet bowl that was easy to clean, with no leaky joints. From that point, improvements in ordinary domestic toilets were seen in details rather than basic principles; carefully designed pans made flushing more efficient, needing less water and a lower cistern, for example.

How it works

When you push the toilet handle down, it releases water in a rush from the cistern into the bowl, washing the contents round the U-bend and into the sewer. A float attached to an inlet valve in the cistern descends as the water level falls, opening the valve to let more water into the cistern. As the water rises again, the float goes up, gradually closing the inlet valve. (If the inlet valve fails and continues to let in water, an overflow pipe takes the excess water either out of the building or into the toilet bowl). Up to 1999 almost all toilets in the UK were "siphonic". When you push the handle you prime a siphon with water and this starts the cistern emptying. When the cistern is empty, no more water can flow. Since 1999, it's been permissible to use other mechanisms in the UK, such as the drop, flap or flush valves. In these types, pushing the handle lifts a valve at the bottom of the cistern, allowing water

to flow. The flow of water keeps the valve open. When the flow stops, the valve drops shut. Modern valve systems are claimed to produce a more efficient “rush” of water and allow “half flush” options to save water. But a drop valve in the bottom of the cistern can leak, allowing water to flow wastefully into the toilet. A siphonic toilet can’t leak in this way.

SEWERAGE AND SEWAGE TREATMENT

Sewage and sewerage. – Sewage is defined as the liquid and soft solid waste of a community. The removal of sewage is ordinarily accomplished by underground conduits, called sewers, and various appurtenances. The general process of removing sewage is defined as sewerage. A sewerage system comprises all the conduits or sewers, pumping stations, treatment plants, or other works which are necessary to collect, purify, and dispose of the sewage.

Classification of sewage. – Sewage may be classified according to its source as follows. That from residences, institutions, and office buildings is called domestic sewage, sanitary sewage, or house sewage; that resulting from manufacturing or industrial processes is known as industrial waste; and that from runoff during and after storms is called storm water or storm sewage.

Classification of sewerage systems. – A sewer that is intended to carry only domestic sewage and industrial wastes – and is to exclude storm, surface, and ground water – is generally known as a sanitary sewer, sometimes such sewer is called a separate sewer. A sewer that carries any storm water, drainage, and other water from the surface of the street, but not domestic sewage or industrial waters, is commonly known as a storm sewer. Such a conduit is often called a drain, but the term drain is preferably applied to a pipe in which both underground water and surface water are

carried off by gravity. A combined sewer is one designed to carry domestic sewage, industrial wastes, and storm and surface water.

In the separate system of sewerage, provision is made for carrying the domestic sewage and industrial waters in one set of sewers and the storm and surface water in another set. If the system of sewerage consists of combined sewers, it is known as a combined system.

The various sewers comprising the sewerage system may be divided into main sewers and branch sewers. The sewerage from buildings which is carried to the street sewers is called house sewers.

If a branch sewer collects the flow from houses or streets, but does not receive sewage from any sewer, it is known as a lateral sewer. A branch sewer that receives the discharge from two or more laterals is usually referred to as a submain sewer. The sewer that collects the flow from two or more submains is called a main sewer or trunk sewer. Where it is not desirable to have the sewers empty directly into a body of water, the entire flow from a number of sanitary sewers or the dry weather flow from a number of combined sewers may be discharged into an intercepting sewer. A sewer that carries sewage from the lower end of a collecting system to a suitable point of final discharge or to a disposal plant is called an outfall sewer.

Sewer appurtenances. – Various appurtenances are needed for the proper functioning of a sewerage system. These include manholes, which are shafts or chambers allowing access to the sewers; lamp-holes which permit inspection of the sewers from adjacent manholes by means of lights; inlets, through which the storm or surface water enters storm or combined sewers; cast basins, which serve as inlets for storm or surface water and also catch and retain some of the solid material carried by the water; flush tanks, by means of which large quantities of water are discharged at intervals

to wash out repositis in the sewers; and regulators which control the flow of sewage in combined sewers.

Desirable properties of sewers.. – In order to facilitate the flow of sewage the inner or contact surface of the sewer should be smooth. The smoothness of the sewer determines to a large extent the slope at which the sewer must be laid. The use of a sewer frequently affects a considerable saving in the cost of construction because it permits employing a shallower trench.

In every case, the sewer should be made of impervious material and the joints should be properly sealed. Otherwise, an excessive quantity of ground water will seep into the sewer and increase the flow. Also, sewage may leach out through open joints and contaminate the surrounding soil. Another objectionable condition that is likely to be caused by such leaching is the formation of deposits of solids in the sewer at the point of leakage. These deposits may seriously interfere with the normal flow.

The inner surface of sewer should be resistant to corrosion by acids, alkalies, and industrial wastes, and to the action of the various products of sewage decomposition. Also the strength of a sewer must be sufficient to carry the loads imposed by backfills. Since sewers are usually designed to serve for periods of 30 to 50 years, their durability and noncorrosiveness are important. In order to obtain economy in the design of a sewer, the materials of construction should be readily available and, in the case of pipes, the sizes should be standard.

STREAM GAGING

Nature of stream gaging. – Stream gaging is a subject which pertains, in general, to the measurement of the flow of water in open channels, and in particular, to the determination of the volume of water passing a given cross-section of a stream, at various gage heights, for the purpose of calibrating the stream.

Stream gaging operations consist in making such observations as are necessary to calculate the rate of flow. The method to be used and the data to be observed will be determined by such factors as the volume and velocity of flow, the type of channel, the facilities available, the degree of accuracy required, and the time involved

Discharge. - The discharge is the volume of water passing a given section in a given time. It is equal to the product of an area, A , and a velocity, V , and is denoted by the letter Q . The area may be that of a single section of the channel or it may be the average of several sections, depending on the manner in which the velocity is determined. The velocity may be measured at a single section by some such instrument as a current meter, or it may be determined by the timing of floats over a course, or the measurement of the slope of the water surface.

Stage. – The stage of a stream is the elevation of its water surface. In general terms, it may be referred to as high, medium, or low. Otherwise, it may be expressed in terms relative to some datum plane as indicated by a gage. The datum plane may be mean sea level, the deepest point in the channel, or any other point to the elevation of which the elevation of the water surface is arbitrarily referred.

Laws governing flow. – Water flowing in a stream is subject to various laws, some of which are known but many of which are too intricate to permit of mathematical statement. It has been found, however, that the velocity of a stream is affected by 1 – the frictional resistance offered by the bed and sides of the stream, together with other retarding forces, 2 – the hydraulic radius, and 3 – the slope of the water surface. The effect of the frictional resistance and other retarding forces, concerning whose laws little is known, is expressed in empirical formulas by means of a coefficient. The velocity has been found experimentally to vary

very nearly with the one-half power of the hydraulic radius and the slope.

The hydraulic radius is the ratio of the area of the cross-section to wetted perimeter. The length of the wetted perimeter will determine the amount of frictional resistance. Consequently, for a given slope of water surface and area of cross-section, the shape which gives the minimum wetted perimeter will give the maximum hydraulic radius and, in turn, the maximum velocity. For a river, the value of the hydraulic radius is continually changing due to the continual change in the area and shape of the channel sections.

The surface slope is the primary cause of velocity. A level water surface would result in no flow but if the surface is higher at one point than at another, gravity will cause the water to flow to the lower level. The velocity is kept constant by reason of the friction of the bed and sides which balance the accelerating force due to the slope of the water surface.

FLOATS AND FLOAT MEASUREMENTS

Types of floats. – There are three types of floats which are used in making float measurements, namely, (a) surface float, (b) double or subsurface float, and (c) tube or rod float.

Surface floats. – Surface floats are designed to move with the same velocity as that of the water at the surface, and therefore should be made small and light in weight. The shape and weight should be such as to minimize the effects of any extraneous forces which act upon it to interfere with its travel. Such forces are the wind blowing against the exposed surface of the float and the surface ripples and eddies, the latter having an alternately retarding and accelerating effect. Even simpler types are sometimes used such as, corked bottles, oranges, blocks of wood, etc.

The use of this type of float affords the quickest method of making a velocity measurement but, due to the action of the wind and the

eddies in the water surface, the results obtained by it are liable to be considerably in error. Also, the float registers the velocity of but a few particles of water in the water surface, and then for only a short period of time, so that the relation between the observed velocity of the float and the mean velocity of the water is not at all fixed and any reduction coefficient based on this ratio may be quite inapplicable for accurate gaging. At best, this type of float is suitable only for measurement of streams at flood stage or for a rough reconnaissance of a river.

Sub-surface or double float. – It consists of a small surface float from which is suspended a weight slightly heavier than water. The surface of a float serves to indicate the position of the float and to support the weight. The cord should be adjustable in order that the weight may be placed at any desired depth. The weight should offer large lateral resistance and should be circular in cross-section in order to offer equal resistance in all directions. It is made hollow in order to offer a small vertical resistance thereby lessening the effect of eddies and vertical currents.

This type of a float is well equipped for deep rivers and in streams where there are floating weeds and grass. It is more reliable than the surface float because it is not subject to the wind and eddies to the extent that is true of the surface float. On the other hand, there are certain disadvantages to be found with the double float. It has the same disadvantage as the surface float in that it moves with a single pulsation of water and measures the velocity of only a few particles for a short length of time. In addition, the exact position of the subsurface float is uncertain. Its position is supposed to be indicated by the surface float and the length of the cord, but due to the action of the wind on the surface float and the pressure of the water on the cord, the subsurface float's position will vary and the surface float will not indicate its position.

Tube of rod floats. A tube float is a cylindrical tube of wood or hollow metal 1 to 3 in. in diameter weighted at the bottom to keep the tube in a vertical position while floating. The tube should be designed to float with a short length, perhaps 3 or 4 in. Extending above the water surface in order to make visible to the observer the passage of the tube over the course. This projection also affords a place to grip the rod when immersing or withdrawing it from the water. The length of the tube should be such as to bring its bottom within a short distance of the bed. If the tube extends too close to the bed, any bobbing due to improper immersion or to the eddying of the water will cause the tube to strike the bed and interfere with its passage. This type of float will give a better determination of the mean velocity of the water than the surface and double floats for it is acted upon by the water nearly its whole depth.





KEYS

LESSON 1

1: 1 – is transported, 2 – is taken up, 3 – is polluted, 4 – is known, 5 – is balanced, 6 – are cooled, 7 – is transported, 8 – are evaporated, 9 – be increased, 10 – is released

11: 1 – 6, 2 – 2, 3 – 7, 4 – 5, 5 – 3, 6 – 9, 7 – 1, 8 – 10, 9 – 8, 10 – 9

111: 1 – 6, 2 – 10, 3 – 7, 4 – 8, 5 – 9, 6 – 5, 7 – 4, 8 – 1, 9 – 3, 10 – 2

1V: 1 – 2, 2 – 8, 3 – 7, 4 – 3, 5 – 4, 6 – 9, 7 – 10, 8 – 5, 9 – 6, 10 – 1

TEST

1: 1 – constant, 2 – wastes, 3 – is divided, 4 – heats, 5 – is evaporated, 6 – is transported, 7 – condensation, 8 – reaches, 9 – precipitation, 10 – is locked away

11: 1 – загальна кількість, 2 – приблизно, 3 – атмосферний пил, 4 – побутовий дим, 5 – поверхневий стік, 6 – підземні води, 7 – у великому масштабі, 8 – скальні матеріали, 9 – невикористаний, 10 – прісна вода

111: 1 – watery fruit, 2 – woollen cloth, 3 – modern methods, 4 – water supply, 5 – at great distances, 6 – air masses, 7 – final stage, 8 – take up, 9 – clean water, 10 – hydrologic cycle

1V: 1 – assumes, 2 – is taken up, 3 – causes, 4 – is known, 5 – runs, 6 – is contained, 7 – is treated, 8 – produce, 9 – grows, 10 – be provided

LESSON 2

1: 1 – 10, 2 – 9, 3 – 1, 4 – 2, 5 – 3, 6 – 8, 7 – 4, 8 – 5, 9 – 6, 10 – 7

11: 1 – 7, 2 – 1, 3 – 2, 4 – 8, 5 – 3, 6 – 4, 7 – 5, 8 – 9, 9 – 6, 10 – 10

111: 1 – 2, 2 – 7, 3 – 3, 4 – 6, 5 – 4, 6 – 5, 7 – 9, 8 – 10, 9 – 8, 10 – 1

1V: 1 – 6, 2 – 7, 3 – 2, 4 – 5, 5 – 8, 6 – 4, 7 – 3, 8 – 1, 9 – 10, 10 – 9

LESSON 3

1: 1 – 8, 2 – 2, 3 – 7, 4 – 1, 5 – 3, 6 – 4, 7 – 5, 8 – 6, 9 – 10, 10 – 9

11: 1 – 5, 2 – 1, 3 – 6, 4 – 2, 5 – 3, 6 – 4, 7 – 10, 8 – 9, 9 – 7, 10 – 8

111: 1 – 2, 2 – 8, 3 – 7, 4 – 1, 5 – 3, 6 – 6, 7 – 9, 8 – 4, 9 – 10, 10 – 5

1V: 1 – 5, 2 – 10, 3 – 7, 4 – 2, 5 – 1, 6 – 4, 7 – 9, 8 – 3, 9 – 8, 10 – 6

TEST

1: 1 – solving, 2 – providing, 3 – building, 4 – brushing, 5 – heating, 6 – saturation, 7 – gravity, 8 – importance, 9 – advantages, 10 – watermark

11: 1 – водяна парв, 2 – в меншій мірі, 3 – питна вода, 4 – річний стік, 5 – нерівномірний розподіл, 6 – кількісні зміни, 7 – забруднення води, 8 – свердловини, 9 – точка замерзання, 10 – вміст води

111: 1 – solid ice, 2 – brief thaw, 3 – threat to health, 4 – private company, 5 – surface reservoirs, 6 – fresh water, 7 – porous rock, 8 – hydrostatic pressure, 9 – in practice, 10 – in accordance with

LESSON 4

1: 1 – 2, 2 – 5, 3 – 1, 4 – 9, 5 – 3, 6 – 4, 7 – 7, 8 – 6, 9 – 10, 10 – 8

11: 1 – 7, 2 – 1, 3 – 10, 4 – 8, 5 – 2, 6 – 3, 7 – 4, 8 – 5, 9 – 6, 10 – 9

111: 1 – 1, 2 – 3, 3 – 10, 4 – 9, 5 – 8, 6 – 2, 7 – 4, 8 – 7, 9 – 6, 10 – 5

1: 1 – is followed, 2 – is involved, 3 – is called, 4 – are located, 5 – are filtered out, 6 – is vacated, 7 – is removed, 8 – is not interrupted, 9 – is optimized, 10 – is pushed

11: 1 – 3, 2 – 10, 3 – 9, 4 – 1, 5 – 2, 6 – 4, 7 – 5, 8 – 6, 9 – 8, 10 – 7

111: 1 – 2, 2 – 9, 3 – 7, 4 – 1, 5 – 3, 6 – 8, 7 – 4, 8 – 5, 9 – 10, 10 – 6

1V: 1 – 5, 2 – 8, 3 – 7, 4 – 1, 5 – 6, 6 – 2, 7 – 3, 8 – 4, 9 – 8, 10 – 9

TEST

1: 1 – purifier, 2 – head tank, 3 – chemicals, 4 – is concentrated, 5 – cleaning, 6 – environment, 7 – cars, 8 – mechanical and biological, 9 – was extracted and raised, 10 – self-running

11: 1 – промислові стічні води, 2 – очищена вода, 3 – вуличний руч, 4 – стародавній Єгипет, 5 – мідні труби, 6 – фільтраційна система, 7 – відстійник, 8 – питна вода, 9 – потреби в воді, 10 – безперервний процес

111. 1 – extra purification, 2 – water resources, 3 – effluent quality, 4 – countercurrent filtration, 5 – opposite direction, 6 – reservoir water, 7 – poisoned air, 8 – Paris suburb, 9 – heating system, 10 – in order to



GLOSSARY



Національний університет
водного господарства
та природокористування



above- над

a few - декілька

a great deal of – велика

кількість

a number of – ряд, кілька

a variety of – цілий ряд

about 60 per cent – приблизно

60 відсотків

above- над

accomplish- здійснювати

according to – згідно з

account for – охоплювати,

включати

accumulate – накопичувати

(сь)

accumulated snow –

накопичений сніг

act - діяти

act – закон

acuteness- гострота

add- додавати

admixture- домішка

advance of winter – прихід

зими

advantage - перевага

air masses – повітряні маси

air pollution – забруднення

повітря

air- провітрювати

all over the area – по всій

території

all round the city – повсюду

місту

allow- дозволяти

amount - кількість

an average of- в середньому

ancient Egypt - стародавній

Єгипет

ancient Greece – стародавня

Греція

ancient Rome – стародавній Рим

annual discharge – щорічне

витікання

annual runoff – щорічний стік

annual satisfaction – щорічне

задоволення

appreciable - значний

appreciable amounts – помітні

кількості

approximately – приблизно

area - територія , площа

arms race – гонка озброєнь

artery – артерія

artesian well – артезіанська

свердловина

artificial - штучний

artificial precipitation – штучні

опад

as - тому що

as for - щодо

as regards – що стосується

as well - також

assume - набувати

atmospheric dust –

атмосферний пил

atmospheric water – атмосферна

вода

auxiliary treatment – додаткове

очищення

available - що є в наявності

average content – середній

ВМІСТ

average depth – середня

глибина



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водного господарства
та природокористування



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В



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та природокористування



back in 1973 – ще в 1973 р.

backwashing- зворотна

промивка фільтра

balance –зрівноважувати

basic principle – основний

принцип

basic- основний

basin – басейн

bear - нести

become - ставати

bed- шар, загрузка

beneath - під

bluish hue – голубуватий

відтінок

body of water – водоймище

boggy area – болотиста площа

boil – кип'ятити

boring well - свердловина

boro hole – свердловина

brief thaws – короткі відлиги

brine – розсіл, ропа, морська

вода

bring about – призвести до

викликати

bubble – бульбашка, братися

бульбашками

by far - набагато

by means of – за допомогою



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calcium – кальцій

call - називати

call for – вимагати,

потребувати

canal – канал

carbonate – карбонат

cause – спричиняти,

примушувати

cavity – порожнина

certain - певний

certain reservoirs – певні

водойми

chain bucket elevator – цепний

ковшовий підйомник

change - змінювати

channel- пускати по каналу

cheerfully- бадьоро

chemical coagulation – хімічна

коагуляція

chemical industry – хімічна

промисловість

chemical precipitation – хімічне

осаджування

chief - головний

chloride – хлорид

chlorine- хлор

chromium – хром

clean sand – чистий пісок

clean water – чиста вода

cleanse- чистити,очищати

closed cycle operation –

безстічна робота

cloud - хмара

coal- вугілля

community – громада,

суспільства

comparatively – порівняно

composition - склад

compound – сполука

condensation – конденсація

condense – конденсуватись

conduit – трубопровід, акведук

constant – постійний

contain- містити, вміщати

contaminant – забруднююча

речовина

content – вміст

continuous filtration –

безперервна фільтрація

continuous washing –

безперервна промивка

continuous- безперервний

convenient water – зручна вода

conventional practice –

звичайна практика

conventional-

звичайний,традиційний

cool - охолоджувати

copper – мідь

copper pipes – мідні труби

cotton fabric – бавовняна

тканина

countercurrent- протипотічний

countercurrent filtration –

протипоточна фільтрація

creation - створення

crude oil – сира нафта.

crust – кора

cubic kilometre – кубічний

кілометр

cubic miles – кубічні милі

cutting cycle – цикл очищення
cycle – цикл

cyclical movement – циклічний
рух



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decomposable – той, що

розкладається, гниє

density – густина, щільність

density of ice – щільність
льоду

depend upon – залежати від

depth - глибина

derive -отримувати

desalination plant –

опріснювальна установка

desalination -опріснення

desire- бажати

desperate struggle –

відчайдушна боротьба

destroy- руйнувати

develop - розробити

devise- винаходити

dewater- обезводнювати

dike – гребля

diminish – зменшувати

direct - направляти

direct flow system –

прямопотічна система

direct- безпосередній,прямий

directly - безпосередньо

discharge – викид, витікання,
спуск

discharge screen – вихідний

сітчастий фільтр

disease – хвороба

disinfection – дезінфекція

dispose of – усувати, видаляти

distribution system –

розподільна система

district – район

district heating – районне
опалення

divisible - той що ділиться

domestic purposes – побутові
цілі

domestic smoke – побутовий
дим

domestic water – побутова
вода

drain – стікати, витікати

drainage – дренаж, стік

drainage basin – площа

водозбору

drinking water – питна вода

drip – капати, падати

краплями

drive- проганяти

dry - сухий

dry cement – сухий цемент

dry- cleauing – суха чистка

dry out - висихати



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earth's crust – земна кора

earth's entrails – надра землі

earth's water – вода землі

economic method – економічний
метод

economic problems –

економічні проблеми

effective method – ефективний
метод

effluent – стік, витік, той, що
витікає

effluent quality – якість стоку

either ... or – чи ... чи, або ... або

energy crisis – енергетична
криза

enormous quantities –

величезні кількості

enter – увійти, поступати

estimate – підраховувати

evaporate – випаровувати(сь)

eventual release – кінцеве
вивільнення

everywhere - всюди ,скрізь

exactly -точно

exhaust fumes – вихлопні гази

exhaust- вихлоп, вихлопний

extra purification – додаткове
очищення



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face cutter – ніж для очищення

поверхні

face- поверхня

fall - падати, випадати

fallen snow – полеглий сніг

farming – сільське

господарство

faucet – вентиль,

водопровідний кран

federal government -

федеральний уряд

feed – жити, живлення

fertilizer – добриво

fibre – волокно

filter bed – шар, що фільтрує

filter medium – матеріал, що
фільтрує

filtered effluent – стік, що

фільтрується

filtering action – дія фільтрації

filtering face – фільтрувальна
поверхня

filtration process – фільтраційний
процес

filtration system – система
фільтрації

final stage – кінцева стадія

final washing – кінцева промивка

final- кінцевий

find- знаходити

fine- тонкий, витончений

finer purification- більш тонке
очищення

first of all – перш за все

follow- йти за, йти слідом

flood – повінь, затопляти,
виходити з берегів

flow – потік, текти

flow out - витікати

flow rate – швидкість потоку

fluoride – фтор

fluoride – фтор

flush a toilet – промивати
туалет

foliage – листя

food stuffs – продукти
харчування

foot -фут

for example - наприклад

for instance - наприклад

for this reason – на цій підставі

formation of crust – утворення
насти

former state – попередній стан

free - вільний

freeze – замерзати

frequency- частота

fresh water – прісна вода

fresh water – прісна вода

fresh water – прісна вода

fume- дим

further- наступний

filtered water – фільтрована вода



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gallon – галон

general sources – загальні

джерела

generate - виробляти

genic mutation – генні мутації

gigantic projects - гігантські

проекти

gigantic reservoir – гігантська

водойма

glacier – льодовик, глетчер

go into operation – увійти в дію

gravel – гравій

great distances - великі

відстані

Great Lakes – Великі Озера

great variety – велике

розмаїття

greater proportion – більша

частина

ground water – ґрунтова вода

groundwater table – рівень

ґрунтових вод



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hail – град

head tank – головний резервуар

heat – нагрівати

heat-and-power plant -

теплоелектроцентрально

heating- опалення

heavily- дуже

heavy snow – важкий сніг

heavy- сильний

hilltop- верх горба

hopper bottom – конічне дно

hopper- бункер

hose – шланг

however - проте

human requirements – потреби

людей

humidity – волога

hydraulic diaphragm – гідравлічна

діафрагма

hydrocarbon – вуглеводень

hydrologic cycle –

гідрологічний цикл

hydrosphere – гідросфера

hydrostatic pressure –

гідростатичний тиск



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ice cap – льодова шапка

important - важливий

important role – важлива роль

impure – брудний, нечистий, з домішками

impurities – домішки

in fact – фактично

in order to – для того, щоб

in practice – на практиці

in the form of snow – у формі снігу

in the meantime – між іншим

inch - дюйм

include- включати

increase – збільшувати, зростати

increasing depth – збільшена глибина

individual wells – окремі свердловини

industrial effluents – промислові стоки

industrial companies -

промислові компанії

industrial smoke –

промисловий дим

industrial waste – промислові відходи

infiltration – інфільтрація, проникнення

influent - той, що втікає

influent wastewater – стічна вода, що вливається

initial obstacle – початкова перешкода

initial- початковий

inland seas – внутрішні моря

insecticide – інсектицид

installations- споруди

intake – всмоктування, забір

intermittent washing –

переривиста промивка

intermittent- той, що

перепізається

internal problems - внутрішні проблеми

intervene - втручатися

inundate – затоплювати, заливати

interrupt- переривати

invariable – незмінний

involved- зв'язаний з цим

ion – іон

irreversible changes –

необоротні зміни

island- острів



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lack - відчувати нестачу
 lake water – озерна вода
 land surface – земна поверхня
 landfill – звалище відходів
 large-scale method –
 великомасштабний метод
 largest source – найбільше
 джерело
 late winter – пізня зима
 later stage – пізніша стадія
 latitude – широта
 laundering – прання
 layer – шар
 leach – вилигувати
 lead – свинець
 leaf(leaves) – лист (листя)
 leak – давати течу, протікати,
 просочуватись
 leaky – що протікає
 level- рівень
 lie - полягати в .
 likely - ймовірно .
 limited value – гранична
 величина
 line – облицьовувати
 line- трубопровід
 linger over- затримуватися,
 затягуватися
 liquid – рідина
 little by little – мало помалу
 local authorities – місцева
 влада
 locate- розташовувати
 lower - нижній
 lower limit – нижня межа

lock away – замкнути



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magnium – магній

main factors – головні фактори

main stages – головні стадії

main- головний

maintain - підтримували

major advantage – головна

перевага

make use of - використовувати

man's use – використання

людиною

man-made – штучний

mechanical cutter – механічний

ніж

medium – середовище

meet targets – задовольняти

цілі

melt – танути

mile - миля

mixture- суміш

modern methods – сучасні

методи

moisture - волога

moreover - більш того

most of - більшість

move – рухатись



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natural distribution –

природний розподіл

natural storage – природне

накопичення

near future – найближче

майбутнє

necessarily - неминуче

necessary methods – необхідні

методи

need - потребувати

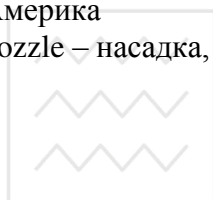
neither ... nor – ні ... ні

nitrate – нітрат

North America – Північна

Америка

nozzle – насадка, сопло



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obstacle - перешкода

occur - відбуватись,

попадатися

of course – звичайно

oil fields – родовища нафти

old snow – старий сніг

on a large scale – у великому

масштабі

one can – можна

opposite - протилежний

opposite direction – протилежний

напрямок

opposite- протилежний

organic environment –

органічне середовище

our era – наша ера

out of man's reach – поза

межами

outlet – витік, стік, верхів'я

overfertilize – занадто

удобрити

overflow – переповнений

ozone station – озонна станція



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Paris suburb – передмістя

Парижа

particles - частинка

particularly - особливо

peculiar taste – особливий смак

penetrate - проникати,

попадати

per capita - на душу населення

percolate – проникати,

просочуватись

permeable rocks – проникні

породи

permeable- проникливий

permeate - просочуватись

pesticide – пестицид

petroleum – нафта, газ

phreatic - ґрунтовий

phreatic surface – фреатична
поверхня

physico-chemical processes –
фізико-хімічні процеси

pipe – передавати по трубах

pipe line – трубопровід

plant - рослина

plentiful water – рясна вода

point - точка, місце, пункт

poisoned air- отруєне повітря

polar glacier – полярний

льодовик

political problems - політичні
проблеми

pollutant - забруднювач

pollute – забруднювати

polluted area – забруднена

територія

polluted reservoirs –забруднені
водойми

polluted water – забруднена
вода

pollution – забруднення

pollution control station –
станція контролю забруднення

pollution problem – проблема
забруднення

pore – пора

porous – пористий

porous rock – пориста порода

potable - питний

potassium – калій

potential source – потенціальне
джерело

precipitate – осаджувати,
опадати

precipitation – опад

pregnancy – вагітність

preliminary treatment –
попереднє очищення

pressure - тиск

primary treatment – первинне
очищення

primitive system - примітивна
система

private companies – приватні
компанії

process- обробляти

processed water – оброблювана
вода

produce - виробляти

promote- сприяти

public supply – комунальне
постачання

pure - чистий

purify – очищати

purifying facilities – очисні

споруди

purifying plants – очисні

споруди

purifying technology –

технологія очищення

purpose - ціль, мета

push- штовхати



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qualitative changes – кількісні

зміни

quality- якість

quantity - кількість

quarters- квартал



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radioactive material –
 радіоактивний матеріал
 rainfall – злива, опади
 rapidly - швидко
 rather- швидше, охочіше
 raw water – необроблювана
 вода
 reach – досягати
 readily - легко, без труднощів
 recent years – недавні роки
 recently - недавно
 recreation – розвага,
 відпочинок
 recycle- відправити на
 повторну переробку
 reezing point – точка
 замерзання
 refine – очищувати
 regional temperature –
 регіональна температура
 relatively - відносно
 relax- слабшати, ослаблятися
 relaxing diaphragm – розслаблена
 діафрагма
 release - випускати
 remain - залишатись
 remove- усувати
 Renaissance period – період
 Ренесансу
 render - робити,
 перетворювати
 renewable resources –
 відновлювані ресурси
 reserves – резерви
 reservoir water – вода водойми

residential centre – житловий
 центр
 residential centre – житловий
 центр
 retain - утримувати
 return – повертати(ся)
 rise- підвищення
 river watermark – річкова
 відмітка води
 rock - порода
 rock formation – скальне
 утворення
 rock materials – скальні
 матеріали
 root – корінь
 rubber – гума
 run - текти
 run - текти
 runoff- стік



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safe drinking water – надійна

питна вода

safe drinking water – надійна

питна вода

saline content – вміст солі

saline – солоний, сольовий,
соляний

salinity – солоність

salinity – солоність

salt - сіль

salt water - солона вода

sand bed – піщаний шар

sand push – поштовх піску

saturation – насичення

seep – просочуватись

second stage - друга стадія

second time purification –
повторне очищення

second utilization – друге
використання

at the expense – за рахунок

sediment – осадок

selenium – селеній

self-cleaning – самоочищення

self-running canal – самотічний
канал

separate states – окремі стани

settle down – поселятись

settler overflow –

переповнення відстійника

settler- відстійник

settling tank - відстійник

several - декілька

sewage – стічні води

sewer waters – стічні води

sewer- колектор, стічна труба

shell- оболонка

side- бік

silicate – силікат

sink - опускатися

sleet – сніг з дощем, сльота

slow- повільний

sludge sand mixture – суміш

мулу та піску

sludge- мул

small proportion – мала
частина

smelt – виплавляти

snow fields – снігові поля

so... that - так ... що

sodium chloride – хлорид

натрію

soil – земля, ґрунт

solid – тверда речовина

soil moisture – волога ґрунту

soil moisture – волога ґрунту

solar radiation – сонячна

радіація

solid ice – твердий лід

solid particle – тверда частка

solids-зважений шар

осаду, тверді речовини

something like - приблизно

sometimes - інколи

sooner or later – рано чи пізно

soot – сажа

source - джерело

South America – Південна

Америка

space- місце

spanned valley – перекрита

долина

special bridge – спеціальний

міст

specific gravity – питома вага

sponge-like action –

губкоподібна дія

spring – джерело

sprinkle streets – поливати

вулиці

state – стан

steam - пара

steel corporation – сталева

корпорація

sterilized water – стерілізована

вода

still-born babies –

мертвонароджені діти

storage reservoirs –

водосховище

store – запасати, зберігати

stream - струмок

streamflow – струменева течія

subsequently -згодом, потім

subsurface water – під

поверхнева вода

subterranean - підземний

subterranean sources – підземні

джерела

subterranean water – підземна

вода

suburb- передмістя

successful - вдалий

successful method –успішний

метод

suddenly - раптом

sulfate – сульфат

sulfide – сульфід

supertant – той, що спливає

supply – постачання,

постачати

surface drainage – поверхневий

дренаж

surface layers – поверхневі

шари

surface reservoirs – поверхневі

водойми

surface runoff - поверхневий

стік

surface water – поверхнева

вода

swamp – болото



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table- рівень

take a shower – приймати душ

take place – відбуватися, мати місце

take up - поглинати

tap – починати, освоювати

technical viewpoint – технічна точка зору

temporary storage – тимчасове накопичення

that is - тобто

the only - єдиний

the only stage –єдина стадія

the...the... чим... тим

three hours' walk away – на відстані трьох годин ходьби пішки

thus- таким чином

to a high level - на високий рівень

to a lesser extent - в меншій мірі

to be in progress - відбуватись

together with - разом з

total amount – загальна кількість

total global evaporation - загальне глобальне випаровування

total precipitation – загальні опади

toxicity – токсичність

traffic- вуличний рух

transfer- переміщати

transport – переносити, переміщати

trap - затримувати

treat – обробляти

treatment plant – очисна споруда

tributary – притока

tubular – трубчатий

tubular shell – трубчата оболонка

turn on – включати



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undergo - зазнавати
underground wells – підземні
свердловини

underground(ground) water –
грунтова вода

underground(ground) water –
грунтова вода

underlying rock – основна
порода

unfortunately- на жаль

uniform - рівномірний

uniform flow – рівномірний
потік

unpleasant smell – неприємний
запах

upper - верхній

upper surface – верхня
поверхня

up-to-date – сучасний

urban dweller – мешканець
міста

usable - придатний для
використання

usable water –

використовувана вода

user – користувач



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vacate- звільняти

varour – пара

various dumps – різні звалища

vary - коливатися,

змінюватися

vegetation -рослинність

volatile – летючий, леткий



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wash water – промивна вода

washing column – промивна колонка

washing column- промивна колонка

waste – відходи

waste dump – звалище

відходів

waste matter – смітєва речовина

wastewater line – трубопровід стічної води

water bearing clouds –

водоносні хмари

water consumption –

водоспоживання

water consumption –

водоспоживання

water content – вміст води

water discharge – витікання

(скидання) води

water exchange – водний обмін

water legislation – водне

законодавство

water main – магістральний

водопровід

water needs – потреби в воді

water pollution – забруднення води

water purification – очищення води

water purifier – очищувач води

water requirement – потреба в воді

water reserves – водні резерви

water resources - водні ресурси

water supply - водопостачання

water supply system- система водопостачання

water table – водний рівень

water vapour – водяна пара

waterfall - падіння води

waterway – водопотока, водний шлях

watery food – водяниста їжа

weight of snow – вага снігу

well- свердловина, колодязь

west end – західний кінець

west winds – західні вітри

wet periods – вологі періоди

whence- звідки

while – в той час як

wind – вітер

woollen cloth – вовняний одяг



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У

yellowish water – жовтувата вода
yet – проте



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