CUMULATIVE IMPACT ANALYSIS
AND NAM THEUN 2 CONTRIBUTIONS

Annex 6: Health and Population Growth

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November 2004
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1 INTRODUCTION

As the largest infra-structure initiative in the Lao PDR, the Nam Theun 2 Hydro-power Project will undoubtedly affect the health status of those living in the project intervention areas, as well as inhabitants of adjacent geographic areas. Although the NT2 Project will act as the catalyst for most health-related impacts, other concurrent and future development projects may synergistically interact to set the stage for a radically different health picture than the one that currently exists. These cumulative impacts on health will affect the rural communities and small towns of Nakai, Nhommalat, and Mahaxay Districts of Khammouane Province, and to a lesser extent, communities in Xebangfai, Nongbok, and Hinboun Districts in Khammouane, as well as Kamkeut (Bolikhamxay) and Xaybouly (Savannakhet).

Being able to reasonably predict potential cumulative impacts affecting health, over a 5-20 year time span, is not an easy task. Twenty years ago, for example, few scientists would have predicted the successful outcome of the human genome mapping exercise, or many of the recent advances in molecular biology, that have dramatically expanded our present awareness and understanding of how to approach health and treat disease. Similarly twenty years ago very few health professionals would have foreseen that HIV/AIDS would explode into a raging pandemic that presently affects more than 40 million people around the globe. The situation in the Nam Theun 2 Project intervention area is considerably less dramatic or complex, but in order to make predictions about cumulative health impacts one needs to review a number of inter-related factors. This includes the overall health situation presently found in various locales of the proposed Nam Theun 2 Project intervention area. It also encompasses potential developments that can arise during the 5-year reservoir-power station construction and village resettlement phase, as well as other concurrent and/or future external macro and micro-economic developments that are reasonably expected to take place locally, nationally, and regionally.

2 THE CURRENT HEALTH SITUATION

2.1 Preface

Since 1995 the NTEC, WB, and ADB, have commissioned a myriad of studies, surveys, and health action plans to determine the health status of local residents of selected communities in the NT2 Project intervention area and plan for their needs. The NT2 Project Office is a repository for dozens of reports outlining the prevalence as well as severity of specific illnesses found in the NT2 Project intervention area. Some of these documents focus attention on identifying specific NT2 Project sector interventions [e.g. irrigation and hydrology] that can potentially increase the incidence and prevalence of vector and water-borne diseases. Other reports discuss communicable disease issues and problems that can emerge with the influx of 4,200 workers, as well as many thousands of camp followers and/or other people migrating to the camp sites and district towns, during the pre-COD phase. Many of these studies, and scenarios, include detailed recommendations on ways to mitigate or reduce the adverse affects that can impact on health. These studies, however, generally focus on the 5-year construction period, and do not take into account other macro and micro-economic developments that are reasonably likely to concurrently take place in and around the NT2 Project intervention area. They also do not take into consideration other future developments that can arise during the 5-year reservoir-power station construction and village resettlement phase, as well as other concurrent and/or future external macro and micro-economic developments that are reasonably expected to take place locally, nationally, and regionally.
developments that may shortly arise as a result of the completion of the NT2 Pro-
ject.

Determining a population’s health status is not a simple exercise, especially in
developing countries where health statistics are often incomplete, not collected or
reported on a regular basis, or simply non-existent. Interpreting provincial-level
statistics is often compounded by the fact that there may be substantial dispari-
ties between urban and rural communities, and/or between rural communities
with access to roads and those that do not have any roads. Even in the latter
category there are many variables that affect health. This may include the fact
that a community is located many hours, or several days walk, from the nearest
health facility. For some ethnic minority communities linguistic and cultural dif-
ferences frequently make it difficult to effectively communicate with government
health officials. This may influence the cultural acceptability of available health
services.

2.2 Presentation of Available Data

Most of the figures indicated below derive from the Lao Reproductive Health Sur-
vey 2000(LRHS) and the National Health Survey 2001(NHS). The Provincial level
data generally derives from the Summary Report of Provincial Data Analysis that
the National Statistics Center published in the early part of 2003. The LRHS
covered all 18 provinces. It included 21,067 households, 40 villages per prov-
ce, and 30 households per village. The NHS was considerably smaller, but
since many of the demographic and health issues were already covered in the
LRHS, it was nevertheless statistically representative of the entire country. The
NHS also covered 18 provinces, but only 6,600 households, 264 villages, and 25
households per village. With respect to communities in Khammouane, Bolik-
hamxay, and Savannakhet provinces, the NHS respectively collected information
from 12, 26, and 7 villages.

The table below, also includes information obtained from other health surveys as
well as statistics extrapolated from MOH publications:

On the surface the figures listed below suggest that health status, especially for
vulnerable groups [women of reproductive age and young children], in the Lao
PDR is still quite poor. It is a picture of communities still affected by a wide range
of vector and water-borne diseases, influenced by ecological and environmental
conditions, and compounded by the lack of access to clean sources of potable
water as well as the safe disposal of human wastes. The figures also reflect poor
access to comprehensive Maternal and Child Health (MCH) services, which in-
clude ante-natal, delivery, post-partum, and family planning-birth spacing ser-
vices for women of reproductive health; and immunization (EPI), nutritional sur-
veillance, and basic health care for infants and young children.

On closer investigation, however, it is considerably more complicated to interpret
national and even provincial level health statistics. A key indicator determining a
nation’s health status is the Maternal Mortality Ratio (MMR). This is the number
of women dying from pregnancy related causes, and/or during labor, and within
the 6-week period following delivery. In the Lao PDR the MMR is 530 maternal
deaths per 100,000 live-births. One of the reasons that MMR is considered such
a sensitive indicator of health is that “child-birth” is a natural phenomenon, and
while many women experience discomfort and pain, it is generally not a life-
threatening event. To illustrate this fact, over the past 5-year period, the Mother
and Child Health Hospital in Vientiane, has encountered 1 maternal only mortal-
ity, even though this facility each year probably performs the highest number of deliveries in the nation. The maternal death, in question, involved a woman experiencing obstructed and prolonged labor, who lived outside of Vientiane, and arrived at the hospital beyond the point where medical staff could be of assistance. Although MMR is often attributed to educational levels, occupation, and socio-economic status, in fact it is directly associated with having access to essential and/or emergency obstetrics care (EOC). Thus an unemployed or uneducated woman living in the capital of Vientiane, or in the provincial centers of Thakhek, Khanthabouly, or Pakxan, would have a much better chance of surviving a complicated delivery than a university graduate teaching in a school in Nakai District of Khammouane. Nakai hospital staff, for example, presently are not trained or equipped, to provide EOC (especially Caesarian Section procedures) to women experiencing obstetrics emergencies.

Table 1: Key Indicators of Health for the 3 Provinces Included in the NT2 Project

<table>
<thead>
<tr>
<th>Health or Demographic Indicator</th>
<th>National and Provincial Rate</th>
<th>National Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>National</td>
<td>KM</td>
</tr>
<tr>
<td>Crude Birth Rate (# Births/1,000 Population)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>34.0</td>
<td>37.0</td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM</td>
<td>35.0</td>
<td>37.2</td>
</tr>
<tr>
<td>BLX</td>
<td>35.0</td>
<td>37.2</td>
</tr>
<tr>
<td>SVK</td>
<td>35.0</td>
<td>37.2</td>
</tr>
<tr>
<td>Crude Death Rate (# of Deaths/1,000 Population)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>6.3</td>
<td>10.8</td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM</td>
<td>6.0</td>
<td>10.5</td>
</tr>
<tr>
<td>BLX</td>
<td>6.0</td>
<td>10.5</td>
</tr>
<tr>
<td>SVK</td>
<td>6.0</td>
<td>10.5</td>
</tr>
<tr>
<td>Natural Rate of Growth (% Annual Population Increase: Crude Birth Rate – Crude Rate)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>2.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>BLX</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>SVK</td>
<td>2.5</td>
<td>2.4</td>
</tr>
<tr>
<td>Infant Mortality Rate (# of Children Dying &lt;1Year of Age/1,000 Live-Births)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>82.2</td>
<td>91.5</td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM</td>
<td>81.0</td>
<td>90.9</td>
</tr>
<tr>
<td>BLX</td>
<td>81.0</td>
<td>90.9</td>
</tr>
<tr>
<td>SVK</td>
<td>81.0</td>
<td>90.9</td>
</tr>
<tr>
<td>Under Five Mortality Rate (# Children Dying &lt;5 Years of Age/1,000 Live-Births)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>106.9</td>
<td>116.2</td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM</td>
<td>105.0</td>
<td>114.9</td>
</tr>
<tr>
<td>BLX</td>
<td>105.0</td>
<td>114.9</td>
</tr>
<tr>
<td>SVK</td>
<td>105.0</td>
<td>114.9</td>
</tr>
<tr>
<td>Total Fertility Rate (Expected # of Children Born to a Woman During Her Reproductive Life-time)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National</td>
<td>4.8</td>
<td>5.4</td>
</tr>
<tr>
<td>Province</td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM</td>
<td>4.5</td>
<td>4.9</td>
</tr>
<tr>
<td>BLX</td>
<td>4.5</td>
<td>4.9</td>
</tr>
<tr>
<td>SVK</td>
<td>4.5</td>
<td>4.9</td>
</tr>
<tr>
<td>Family Planning: (Contraceptive Prevalence Rate (% Married Women Using a FP Method)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-All Methods</td>
<td>32.2</td>
<td>24.2</td>
</tr>
<tr>
<td>-Modern Methods</td>
<td>28.9</td>
<td>23.9</td>
</tr>
<tr>
<td>-Traditional Methods</td>
<td>3.2</td>
<td>0.4</td>
</tr>
<tr>
<td>-Unmet Need for FP Services</td>
<td>39.5</td>
<td>33.9</td>
</tr>
<tr>
<td>Health or Demographic Indicator</td>
<td>National and Provincial Rate</td>
<td>National Ranking</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td></td>
<td>National</td>
<td>KM</td>
</tr>
<tr>
<td>Delivery Practices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- % of Deliveries in Past 5</td>
<td>86.1</td>
<td>80.7</td>
</tr>
<tr>
<td>Years that Took Place at the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home of Expectant Mother</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- % of Deliveries in Past 5</td>
<td>17.4</td>
<td>18.2</td>
</tr>
<tr>
<td>Years Assisted by a Trained</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Worker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Assisted by Health Personnel</td>
<td>13.2</td>
<td>13.0</td>
</tr>
<tr>
<td>- Assisted by TBA</td>
<td>55.1</td>
<td>52.0</td>
</tr>
<tr>
<td>- Assisted by relatives/friends</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ante-Natal Care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(% Pregnant Women in the Past 5</td>
<td>75.8</td>
<td>77.9</td>
</tr>
<tr>
<td>Years that did not Receive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ante-Care)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malaria (Data from CMPE-2002)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- # Malaria Cases</td>
<td>267,454</td>
<td>34,379</td>
</tr>
<tr>
<td>- Morbidity / 1,000 Patients</td>
<td>48.5</td>
<td>104.7</td>
</tr>
<tr>
<td>- Mortality / 100,000 Patients</td>
<td>3.5</td>
<td>5.5</td>
</tr>
<tr>
<td>- Population Protected by IBNs</td>
<td>73.3</td>
<td>83.2</td>
</tr>
<tr>
<td>Acute Respiratory Illness (ARI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- # ARI Cases &lt; 5 Years of Age</td>
<td>48,235</td>
<td>5,562</td>
</tr>
<tr>
<td>- Est. Incidence Rate</td>
<td>5.5</td>
<td>10.7</td>
</tr>
<tr>
<td>Diarrhea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- # Diarrhea Case &lt; 5 Years of</td>
<td>17,792</td>
<td>1,476</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Est. Incidence Rate</td>
<td>2.0</td>
<td>2.8</td>
</tr>
<tr>
<td>- # Deaths of Diarrhea &lt; 5 Years</td>
<td>36</td>
<td>6</td>
</tr>
<tr>
<td>of Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPI Coverage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( % of children 0-11 months [for</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCG &amp; DPT3], children 0-23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>months [for Measles] and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women of Child Bearing Ages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>[for TT2+] receiving immuniza-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tions)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- BCG</td>
<td>48.9</td>
<td>60.0</td>
</tr>
<tr>
<td>- DPT3</td>
<td>35.7</td>
<td>46.0</td>
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<tr>
<td>- Measles</td>
<td>30.3</td>
<td>34.3</td>
</tr>
<tr>
<td>- TT2+</td>
<td>37.6</td>
<td>28.5</td>
</tr>
<tr>
<td>Water &amp; Sanitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>( from LECI &amp; II Surveys</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1998/1999)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- % of Households With Access</td>
<td>50.0%</td>
<td>38.0%</td>
</tr>
<tr>
<td>to a Clean Source of Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- % of Households with Latrines</td>
<td>29.0%</td>
<td>14.0%</td>
</tr>
</tbody>
</table>
### Health or Demographic Indicator

<table>
<thead>
<tr>
<th>National and Provincial Rate</th>
<th>National</th>
<th>KM</th>
<th>BLX</th>
<th>SVK</th>
<th>National Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV/AIDS (NCCA June 2003)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># blood samples tested</td>
<td>91,003</td>
<td>5,196</td>
<td>637</td>
<td>12,609</td>
<td>N.A. N.A. N.A.</td>
</tr>
<tr>
<td># HIV infected</td>
<td>1,102</td>
<td>92</td>
<td>9</td>
<td>487</td>
<td>N.A. N.A. N.A.</td>
</tr>
<tr>
<td># AIDS cases</td>
<td>599</td>
<td>17</td>
<td>9</td>
<td>286</td>
<td>N.A. N.A. N.A.</td>
</tr>
<tr>
<td>- # AIDS deaths</td>
<td>461</td>
<td>17</td>
<td>6</td>
<td>248</td>
<td>N.A. N.A. N.A.</td>
</tr>
</tbody>
</table>

Knowledge of HIV/AIDS & STI Transmission (LRHS 2000)

<p>| | | | | | |</p>
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Know how HIV/AIDS is transmitted</td>
<td>69.3</td>
<td>65.5</td>
<td>49.6</td>
<td>81.3</td>
<td>N.A. N.A. N.A.</td>
</tr>
<tr>
<td>Know how STIs are transmitted</td>
<td>52.0</td>
<td>45.9</td>
<td>36.2</td>
<td>49.0</td>
<td>N.A. N.A. N.A.</td>
</tr>
</tbody>
</table>

If the data in Table 1 was presented according to geographical or ecological zone, with a cross reference to the type(s) of existing health facilities and the capacity/competencies of local health manpower, the numbers would vary considerably, even within the same province as well as within the same district. This is an important concept, or fact, to understand if one is to predict the cumulative impacts on health as a result of the NT2 Project. The health status of ethnic minorities, especially those living in remote mountainous and forested regions of the country, often several days-walk to the nearest health facility, is quite different than that of residents living in the provincial, or at times district, center. Thus Crude Birth Rates, Infant Mortality Rates, Under Five Year Mortality Rates, Total Fertility Rates, Contraceptive Prevalence Rates, EPI Rates, % of pregnant women delivering in a hospital or health center with a trained birth attendant; % and incidence of children < 5 years of age dying or suffering from diarrhea, acute respiratory illnesses, and malaria, etc. for Thakhek, Khamthabouly, and Pakxan, and some of the larger district centers situated along the Mekong River are probably more similar to the figures found in semi-urban Thailand than for that reported above by the LRHS and NHS.

### 2.3 Recent Improvements

It is also important to recognize that specific patterns of morbidity and mortality can dramatically change in a very short period of time. In less than four years, since the completion of the LRHS and NHS, the National Malaria Control Project has greatly reduced the number of illnesses and deaths caused by malaria throughout Khammouane province. This development has substantially reduced the number of patients visiting or being admitted to district hospitals, and will undoubtedly be reflected in lower maternal, infant, and under 5 year old mortality rates in the National Census scheduled for 2005. During this same 4-year period the National Reproductive and Birth Spacing Programme has trained health workers as well as Village Health Volunteers (VHVs) and Traditional Birth Attendants (TBAs) nation-wide, to provide information, counseling and selected services to women and children. All health facilities in Khammouane, for example, are now provided with contraceptive services [e.g. oral and injectable contraceptives, and condoms] for interested couples, while provincial and district hospital...
personnel can insert IUDs. These services, if understood, appreciated, and accepted by local communities, can within a very short period of time and in an extremely cost-effective manner exert a tremendous momentum in reducing maternal and infant mortality rates, especially for rural and remote areas in the NT2 Project intervention area. They are also a key variable in reducing population growth rates.

2.4 Challenges Ahead

Illness and death are a natural part in the cycle of life. Thus as certain health problems and issues are resolved, successfully managed or controlled, or disappear, others almost immediately emerge upon the horizon. Training health workers, and decision-makers, to understand this phenomenon and to observe new health developments in their early-stages, is essential for improving and/or maintaining good health for a given population. Thus as malaria, outbreaks of diarrheal diseases, and complications caused by acute respiratory illnesses amongst young children, gradually becoming less serious issues, the health and other relevant sectors need to be prepared to deal with new patterns of morbidity and mortality. This has already begun to include vehicular accidents, Sexually Transmitted Infections [STIs] & HIV/AIDS, and a wide range of emotional health issues such as depression, anxiety, and suicide. In Khammouane while some of these new health issues are anecdotally becoming more prevalent in and around the provincial and district centers located along the Mekong River, they are nevertheless gradually permeating outward into the key districts that comprise the NT2 Project intervention area. The nature of the construction and resettlement interventions planned during the 5-year pre-COD phase, in addition to other macro and micro-economic developments envisioned for Khammouane and neighboring geographic areas, will definitely exacerbate the potential impact of these new patterns of morbidity and mortality in the NT2 Project intervention area. How serious they eventually become, will to a great extent depend upon the level of concern and awareness of NT2 Project staff, local government, local communities, and the local health sector, as well as the combined willingness to take pro-active measures before a potentially dangerous situation spirals out-of-control.

3 EXISTING HEALTH SERVICES IN THE PROJECT INTERVENTION AREA

3.1 Introduction to the Area

The number of health facilities in the Lao PDR has dramatically increased during the past decade. Nevertheless there are still serious inequities with respect to the distribution of qualified manpower and the location of these sites throughout the nation, within provinces, and even within selected districts. The relatively few central and regional hospitals, located in the Vientiane Municipality and the large provincial centers in the northern (Luang Prabang), central (Savannkahet), and southern (Champassack) sections of the country, account for the largest number of experienced and qualified physicians, surgeons, technicians and public health specialists. The MOH has tried to rectify this situation by constructing new facilities, renovating and modernizing existing sites, as well as offering expanded in-service training opportunities to improve the technical, clinical, and administrative capacity of health workers at all levels. However many problems continue to persist. Many existing hospitals and health dispensaries are under-utilized due to
a lack of appropriate medical supplies and equipment, and/or the low competency-skill levels of the service providers.

3.2 Health Facilities in Khammouane

The health care delivery system in Khammouane, the main site within the Nam Theun 2 Project intervention area, is similar to several other large provinces in the country. As one leaves the provincial capital of Thakhek situated alongside the Mekong River, and heads eastward through the Mekong plain, up into the hills, and then into the more remote mountainous forests, the number of health facilities and the qualifications of local medical staff dramatically decline. Below are two tables illustrating the distribution of health manpower, as well as the actual location of health facilities, in Khammouane.

Table 2: Existing Health Infra-Structure in Khammouane Province.

<table>
<thead>
<tr>
<th>Province &amp; Districts</th>
<th>Provincial &amp; District Hospitals</th>
<th>Health Centers</th>
<th>Village Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Provincial &amp; District Hospitals</td>
<td>District Hosp. Beds</td>
<td>Total # Health Centers</td>
</tr>
<tr>
<td>Thakhek</td>
<td>PH</td>
<td>150</td>
<td>26</td>
</tr>
<tr>
<td>Mahaxay</td>
<td>B</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>Nongbok</td>
<td>B</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Hinboun</td>
<td>B</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>Nhommalat</td>
<td>B</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Boualapha</td>
<td>B</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Nakai</td>
<td>B</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Xebangfay</td>
<td>B</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Xaybouathong</td>
<td>B</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>146</td>
<td>71</td>
</tr>
</tbody>
</table>

Table 2 graphically illustrates the unequal distribution of health facilities located in Khammouane. The largest concentration of hospital beds and health centers are concentrated in the three districts [Thakhek, Nongbok, and Hinboun] situated along the Mekong River, where it should also be noted that the majority of the people in the province live. Although the province has 67 functional health dispensaries, approximately half of these sites are located in the “homes” of local health staff and are not “formal” health facility structures. Most health centers situated > 3 hours from the home of prospective clients are concentrated in the eastern and remoter districts of Nakai, Boualapha, Xaybouathong, Nhommalat, and to a lesser extent Mahaxay. What these figures do not indicate, is that many health dispensaries are actually located more than a 1-2 day walk from the district hospital. Thus seriously ill patients are often beyond the reach of appropriate health care in times of severe illness or emergency. These are precisely the geographic locations where the vast majority of maternal, infant, and under-five year old mortalities occur.
3.3 Health Staff in Numbers

Khammouane has a total of 755 health personnel stationed at 1 provincial health office and 1 adjacent provincial hospital, 9 district hospitals with 9 adjacent health offices, and 67 village level health dispensaries. Health personnel can be divided into two categories comprised of 666 medical staff and 89 non-medical staff. Of the 9 medical staff who completed post-graduate or higher education, all are based at the provincial health office (7) or the provincial hospital (2).

Of the 63 medical staff who completed university level [generally referred to as “Phaet San Sung”], 47 are physicians, 12 are pharmacists and 4 are dentists. Of these categories, 32 (68%) of the physicians are either based at the provincial health office (5) or provincial hospital (27). Five of the districts each have only 1 physician, 2 districts each have 2 physicians, while another 2 districts each have 3 physicians. Of the 15 physicians deployed outside the provincial capital, 6 are stationed at district health offices, 7 at district hospitals, and only 2 at health dispensaries.

Of the 12 pharmacists, 9 (75%) are either based at the provincial health office (8) or provincial hospital (1). The remaining three pharmacists are deployed to two district hospitals and 1 health dispensary. Of the 4 dentists, 2 (50%) are stationed at the provincial hospital, while the remaining two individuals are deployed to two district hospitals.

Of the 173 medical staff who completed a “mid-level” pre-service health curricula [generally referred to as “Phaet San Kang”], 90 are medical assistants, 16 are nurses, 14 are assistant pharmacists, 4 are assistant dentists, 12 are physiotherapists, 21 are laboratory assistants, 9 are hygienists, and 7 are prosthetics assistants. None of the last six categories of health workers are deployed to the health dispensary level. Of these six categories more than 50% of the total cohort are deployed at the provincial level.

Of the 90 medical assistants, 38 (42%) are either at the provincial health office (21) or provincial hospital (17); 48 (53%) are deployed to district hospitals and 1 health dispensary. Of the 16 nurses, 5 (31.5%) are deployed to the provincial health office (1) or provincial hospital (4), while 10 (62.5%) are deployed to district level facilities, and only 1 (6%) is at the health dispensary level.

Of the 421 medical staff who completed a “low-level” pre-service health curricula [generally referred to as “Phaet San Ton”] 389 are nurses, 5 are laboratory technicians, and 27 are pharmacy technicians. Of the 27 pharmacy technicians 12 are deployed to provincial level facilities, while 10 are dispersed between the 9 districts, and 5 are stationed at health dispensaries. Of the 5 laboratory technicians, 3 are at provincial facilities and the remaining 2 are at district facilities. Seven districts do not have any laboratory technicians whatsoever. Of the 389 nurses, 118 (30%) are at the provincial health office (26) or provincial hospital (92), while 172 (44%) are at district health offices (95) or district hospitals (77). The remaining 99 (26%) nurses are stationed at the health dispensary level. This is the only category of professional health worker that is deployed in relatively substantial numbers to health dispensaries.

Of the 89 non-medical staff deployed throughout Khammouane, the only one of significance at the health dispensary level are the “contracted staff” who frequently represent the only category of health worker stationed at remote health dispensaries. Of the 41 “contracted staff”, 37 (90%) are deployed to health dis-
pensaries. Many of these “contracted staff”, deployed to the remote sections of Nakai, Nhommalat, Mahaxay, and Boualapha districts have only completed 2 or 3 grades of primary school. These individuals, however, generally have some previous medical experience, usually as former army nurses or medics. They have subsequently received an additional 6 months of “formal” medical education, at the provincial or district level, before being eligible for deployment to their respective health dispensary.

Of the 153 health workers [both medical and non-medical] deployed to the 67 health dispensaries throughout the province, almost 2/3 [i.e. 63.4%] are located in the three districts that are adjacent to the Mekong River/Plain [i.e. Thakhek, Hinboun and Nongbok]. As mentioned above, approximately half of the 67 health dispensaries in the province are not “formal” health facilities, but rather health stations established in the homes of the local “health staff”. Accordingly the types of services offered at these village level health facilities can dramatically differ from other “health dispensaries” located elsewhere in province or perhaps even within the same district.

<table>
<thead>
<tr>
<th>Table 3: Medical staff by facility and district.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personnel</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Postgraduate level and higher</td>
</tr>
<tr>
<td>University graduate level</td>
</tr>
<tr>
<td>Medical Doctor</td>
</tr>
<tr>
<td>Pharmacist</td>
</tr>
<tr>
<td>Dentist</td>
</tr>
<tr>
<td>Nurse</td>
</tr>
<tr>
<td>Laboratory Specialist</td>
</tr>
<tr>
<td>Middle-level</td>
</tr>
<tr>
<td>Med. Asst</td>
</tr>
<tr>
<td>Nurse</td>
</tr>
<tr>
<td>Midwife</td>
</tr>
<tr>
<td>Assistant Pharmacist</td>
</tr>
<tr>
<td>Assistant Dentist</td>
</tr>
<tr>
<td>Physiotherapist</td>
</tr>
<tr>
<td>Laboratory Assistant</td>
</tr>
<tr>
<td>Hygienist</td>
</tr>
<tr>
<td>Prosthetics Assistant</td>
</tr>
<tr>
<td>Low-level</td>
</tr>
<tr>
<td>Nurse</td>
</tr>
<tr>
<td>Midwife</td>
</tr>
<tr>
<td>Lab. Technician</td>
</tr>
<tr>
<td>Pharmacy Technician</td>
</tr>
<tr>
<td>Non-Medical Staff</td>
</tr>
</tbody>
</table>
### Difficulties and Constraints in the Existing Health System

The situation found in Khammouane, the primary site of the Nam Theun 2 Project, is not substantially different from other large provinces. It is generally difficult to find qualified health personnel willing to be deployed to remote district hospitals and health centers. Although the director of the district health office theoretically can decide whom to deploy or rotate to health dispensaries, he is often constrained by other factors beyond his control. These include the following issues:

- Staff salaries are insufficient to cover expenses associated with the actual cost of living. In the past it was also quite common for monthly salary payments to arrive late. This situation has created a need for district level health personnel to seek secondary occupations, such as agriculture or private medical services, to supplement their incomes and support their families. As such few staff are eager to be deployed to remote health centers.

- Few staff are eager or willing to be posted to remote areas that are plagued with poor living conditions, lack of social services, and/or isolation due to inadequate or non-existent road networks. A large number of remote health dispensaries, as mentioned above, are located anywhere from 1-3 days from the district hospital.

- Few government health personnel are members of ethnic minorities, and accordingly soon find themselves culturally and linguistically isolated from the communities they are sent to serve.

- Family members are also reluctant to move to remote areas, and it is rare for staff, unless they are not married, to take up a long-term assignment without being accompanied by their family.

These constraints have forced many districts to train local villagers, who are subsequently hired on a contractual basis, to be assigned to health dispensaries. In the Nakai District, for example, 10 of the 11 health workers deployed to the five health dispensaries are employed on a “contractual basis”.

The preceding section has emphasized some of the apparent weaknesses and constraints in the existing health care delivery system, as they directly influence the level and quality of health services presently available to various populations living in the proposed NT 2 Project intervention area. Although it is possible that this situation may greatly improve, over the next couple of years, this nevertheless is the context in which analytic scenarios for “business as usual” or “best practice” patterns need to be made. This statement does not necessarily imply
that it will be difficult or impossible to resolve most of the important health problems NT2 Project intervention residents currently face. New health issues and problems, however, related to the construction of the reservoir, power station, downstream channels, as well as other external economic development initiatives, may soon force health personnel to concentrate their efforts on a more select population living in towns and various camp sites. The nature and types of new health problems expected to emerge are also ones for which the existing health care system is presently unprepared or trained to handle. This includes an increase in vehicular accidents, the possible introduction of new vector-borne diseases such as Dengue Hemorrhagic Fever (DHF), or a sky-rocketing incidence and prevalence of HIV/AIDS and STIs.

As the tables above illustrate, most district hospitals in the NT2 Project intervention area presently do not have more than one physician. These facilities also do not have “operating theaters”, and in case of serious accidents or injuries, staff currently can only provide simple emergency care, such as cleaning, suturing, and dressing minor wounds, before sending the patient on to the provincial hospital. The same situation pertains to emergency obstetrics. Each year district hospital staff assist with a relatively small number of uncomplicated deliveries. For complicated deliveries, or true emergencies, the patient needs to be referred to the provincial level. It is unknown how many of such cases, in remote villages, simply die at home.

An equally important issue is the lack of routine comprehensive promotive, preventive, and curative outreach clinics geared to upgrade the technical, clinical, and administrative skills of health dispensary workers, while at the same time providing selected health services to the local population. Certain EPI and malaria control activities appear to be the exceptions. As noted in the preceding section the incidence and prevalence of malaria, the malaria case fatality rates, and the slide positivity rates, have all dramatically declined throughout the Lao PDR. This has come about as a result of the distribution and re-impregnation of insecticide treated bed nets (IBNs), the early diagnosis and treatment of suspected and confirmed malaria cases, and the establishment of drug and bed net revolving funds to sustain these efforts. The National Malaria Control Program, supported by many international donors, has made a dramatic impact in reducing malaria morbidity and mortality and thus has directly contributed to improving the overall health status of people living in rural and remote geographic areas. Deaths from malaria have become rare events in Nakai, Nhommalat, and Mahaxay districts; where formally the overwhelming majority of out-patients and in-patients were treated for malaria; and where malaria was always listed as one of the leading causes of death. These impressive results were to a great extent made possible by the efforts of district and village level health workers and volunteers, supported by mass organizations and local village leadership.

3.5 Village and Household Level

But the overall health status of rural/remote communities will only improve once Primary Health Care activities, focusing on the health of women and young children permeate down to the village and household level. Most rural residents, especially ethnic minority men and women, still do not fully understand and appreciate the importance of birth spacing-family planning services in improving the health of mothers, women of reproductive ages, and young children vulnerable to communicable diseases and malnutrition. Similarly they are not aware of the value of regular ante-natal care examinations to monitor the health of the expectant mother and to identify women who are potentially at risk for complicated la-
Likewise communities, and individual families, are not aware of the need for trained birth attendants to assist at the time of delivery and to visit the mother and newborn infant during the immediate post-partum period to provide important health information concerning breast-feeding, immunization, nutrition, and birth-spacing. Educating women on the value of birth-spacing services, and making these services available at the health dispensary and village level, can in a relatively short period of time dramatically reduce maternal and infant mortality; the two most sensitive indicators of a community’s health status. One of the key messages that is frequently omitted during training sessions is simply, “Contraceptives Save the Lives of Women and Infants”!

4 EXTERNAL ECONOMIC DEVELOPMENT SCENARIOS IN THE KHAMMUANE REGION

4.1 Savannakhet-Khammouane Region Development Plan

In predicting the possible cumulative impacts on health, for different populations living in the NT2 project intervention area, it is essential to foresee to what extent proposed external macro and micro-economic development plans are implemented. In 2001 a series of detailed studies were published suggesting various economic development scenarios for the Savannakhet-Khammouane Region (SKR) which included a three-phased implementation period [i.e. 2001-2005, 2006-2010, and 2011-2020]. The studies proposed that the provincial centers of Savannakhet (Khanthabouly) and Khammouane (Thakhek) strengthen their urban functions as consumption centers, high value added production centers, higher education and training centers, and information centers. Urban town development would be promoted in conjunction with improvements of road networks and the promotion of market oriented agricultural and local industries. Rural center towns would be developed for the tourism and mining industries.

It was suggested that Thakhek be promoted as a gateway for tourism, as well as an industrial city for resource-based manufacturing industries. Its historical buildings would be preserved and renovated, and tourism related facilities would be constructed [especially along the Mekong River]. Mahaxay district center, and to a lesser extent Nhommalat, located near the junctions of Routes 12 and 8B, would become important distribution centers serving the inner land area of Khammouane, as these two road junctions would become major arteries for transporting rural products in Khammouane to domestic and international markets. Nakai, after the completion of the Nam Theun 2 Hydropower Project, would be the site of a large artificial lake envisioned to become one of the major tourist destinations in the SKR. The town of Nakai would become a “mother town” for tourists visiting the lake, as well as the center for a local wood based industry. Boualapha, after the completion of Route 12 would be the closest eco-tourism spot in the region. Hence it was proposed that this town become a tourist as well as a distribution center of local agricultural and handicraft products in the district.

The proposed SKR Development Plan contained several components for major urban-based development initiatives that included, but was not limited to, the following:

- Savannakhet Special Economic Zone (SEZ): The SEZ is to be established adjacent to the new Mekong Bridge to make optimal use of the newly constructed East-West Corridor aimed at linking Thailand-the Lao PDR-Viet Nam. The SEZ will serve multiple functions, including the promotion of logis-
tics (e.g. bonded warehouses, cargo-terminals), processing of export-oriented and resource-based industries, free-markets, and the promotion of the service industry (e.g. hotels, recreation, etc.). A belt along Route 9, from the Mekong Bridge to the junction of Routes 9 and 13 at Seno [in Outhoumphone District] will be designated as the SEZ. Enterprises in the SEZ would enjoy special investment incentives under a proposed SEZ law.

- **Woodworking Industrial Park in Thakhek:** A woodworking industrial park is to be established in and around Thakhek; integrating the currently operating small-scale sawmills. It will have a facility for the log auction market, as well as facilities for design, marketing, and testing for wood-processing industries. The furniture industry will also be invited to locate in the park.

- **Tourism Free Zone:** The designation of a Tourism Free Zone (TFZ) along the East-West Corridor would be an effective mechanism for the promotion of the Lao Tourist Industry in the SKR. It would integrate tourism development and natural/cultural preservation; as well as facilitate the joint promotion of Mekong Tours for international, Thai, and Vietnamese tourists. It could also promote comprehensive tourism management with a one-stop visa control mechanism for international tourists entering the TFZ. The TFZ could serve as a joint training/education site for tourism related human resources in the East-West Corridor, as well as an attractive incentive for Direct Foreign Investment in the Lao tourism industry.

### 4.2 Tourism

At the present time major destinations for international tourists, visiting the Lao PDR, are Vientiane and Luang Prabang. An increasing number of tourists, however, are going to other sites such as the Plain of Jars (Xieng Khouang), Champassack, Luang Namtha, Bokeo, and Savannakhet. Surveys have indicated that international tourists are mainly interested in seeing nature and observing local life and culture. As such the Lao PDR has, in a relatively short period of time, become an international destination for eco-tourism, rather than ordinary sightseeing tourism.

Some potential tourism sites identified in Khammoune are:

- The Nakai-Nam Nature Reserve (NBCA): to observe natural forests and mountainous scenery.
- Phou Hinboun National Reserve: to observe spectacular landscapes with limestone mountains, stone forest formations located on the northern edge of the nature reserve [accessible by Route 8A], and natural caves with underground streams.
- Ethnic minority villages: to observe daily life and culture.
- Pha That Sikhottabong: to visit the 29 meter-high stupa built in the 14th century.
- French Colonial Style Buildings in the Center of Thakhek.

### 4.3 Infrastructure

Long-term and short-term economic plans and proposals are constantly in state of flux. New studies are conducted, keeping in tune with the changing nature of national, regional, and international commercial and political priorities. The Sec-
ond Friendship Bridge, across the Mekong River, connecting Mudahan, Thailand and Savannakhet, Lao PDR, will be an important development in “linking” the Lao PDR to its neighbors and to international markets through the East-West Corridor. The bridge is scheduled for completion in 2006. At the same time the Thai Government has recently publicly stated its intention to support the construction of other bridges across the Mekong River. One would connect Nakorn Phanom and Thakhek, while another would link the northern towns of Chiang Khong and Houay Xay, not far from the so-called “Golden Triangle”; the point where Myanmar, Thailand, and the Lao PDR meet along the Mekong River. A bridge connecting Nathorn Phanom to Thakhek, coinciding with the construction and/or renovation of Routes 8A, 8B, and 12, could in effect create a “mini” East-West Corridor, that would pass through many communities and district towns in the NT2 project intervention area. This bridge would probably be constructed during the period 2010-2020, but depending upon political priorities it could take place earlier.

4.4 Industry

Another interesting recent development concerns the establishment and perhaps expansion of the cement industry in the Lao PDR. The SKR Development Plan identified the cement industry for intensive expansion, based upon the discovery of a large-scale limestone deposit in Mahaxay District. At the present time the Lao PDR imports approximately 90% of its cement requirements from Thailand. Demand by the year 2005 is expected to reach 1.6 million tons; of which 1.3 million tons will be imported. In April 2004 the Bangkok Post reported that 8 of Thailand’s largest cement producers have agreed with a Ministry of Commerce request to gradually cut their exports to “zero”, within the next 5 years to reduce environmental impacts in both Saraburi province as well as Thailand as a whole. In 2004 exports will drop from 12 million to 10 million tons. Most of these exports go to the Lao PDR, Cambodia, and Vietnam. Cement exports surged after the “Economic Crisis” of 1997 when local demand dropped sharply and Thai cement producers needed foreign exchange to offset losses caused by the depreciation of the Thai currency. By 1998 cement exports from Thailand totaled more than 20 million tons. Will this recent decision stimulate direct foreign investment of Thai capital and technical know-how to the Lao PDR, to rapidly expand the capacity of the Lao cement industry? Will Mahaxay District be the major beneficiary of this expansion, and if so could this development have a cumulative impact on health for residents of the NT2 Project intervention area?

Another recent development has been an indication from the Thai government that Savannakhet rather than Mukdahan should become the focal point, or “economic hub”, of the East-West Corridor. This could mean a rapid up-grading and modernization of the recently renovated Savannakhet airport to handle an increased number of international tourists and businessmen. It could also result in the construction of a large airport cargo terminal and other related facilities. What effect will such a decision have on the size and composition of the proposed SEZ?

4.5 Future Scenario

To what extent will all of these proposed developments alter current migration patterns in and around the SKR, as well as throughout the country and the neighboring region as a whole? Many of the above mentioned macro and micro-economic developments will commence, or be completed, within the same five-year time frame that the NT2 reservoir, power station, and other infra-structure
inputs are scheduled to be implemented. Others will not reach fruition until a later point in time. Taken as a whole, or even separately, their potential synergistic cumulative impact on health can be considerable for selected communities and populations living in the NT2 Project intervention area. Many of these plans are based on the assumption that the Nam Theun 2 Hydropower Project will harness and provide electricity needed to plan and undertake large-scale economic development initiatives. Another assumption is that a suitable local labor force will be available to participate in these planned developments. Who will comprise this labor force, and from where will these migrants come?

5 MIGRATION AND URBANIZATION IN THE SAVANNAKHET-KHAMMOUANE REGION

5.1 Urbanization in the SKR

At the present time the overwhelming majority of people living in Savannakhet and Khammouane reside in rural settings, where they usually engage in subsistence and small-scale market oriented agricultural activities. The National Census of 1995 indicated that 83% of the population lived in rural areas in comparison to only 17% inhabiting urban centers. Approximately 14% of the population in Khammouane was classified as urban, while the urban population of Savannakhet represented only 15% of total inhabitants. Only Thakhek district, of Khammouane, had a substantial urban population (37%), and the majority of these urban-dwellers were located in or near the provincial center. In most districts of Khammouane, including Nakai, Nhommalat, Boualapha, Xaybouathong, Xebangfay, and Mahaxay urban residents comprised from <1-5% of the total population. The situation in Savannakhet was slightly different, with Thakhek (50%) and Outhoumphone (15%) districts having relatively large urban concentrations. But these two districts respectively included the provincial center of the most populous province in the country, and the major junction of Route 9 and Route 13 [at Seno]. All other districts in Savannakhet had urban areas that accounted for <10% of the population. The Lao Reproductive Health Survey of 2000, indicates that urbanization had increased somewhat, during the period 1996-2000, with approximately 1/5 (19.9%) of the population now living in urban areas, while the remainder (80.1%) still continued to reside in the countryside.

In Khammouane urban population now represented 22.4% of the total population, while the figure for Savannakhet had increased to 17.1%. Surprisingly Khammouane had now become the 3rd most urbanized province in the country, only following Vientiane Municipality (61.4%) and Luang Namtha (25.0%). Savannakhet’s urban population was ranked 8th in the nation. The above-mentioned macro and micro-economic development scenarios, however, suggest that this situation can easily change in a relatively short period of time and that rapid urbanization and large-scale migration may soon become major issues for the two largest provinces in the Central Region.

5.2 Migration in the SKR

Populations in transit, for temporary or permanent purposes, are ideal focal points for the transmission of disease. This can mean new diseases with which local residents and health personal have little knowledge or experience [e.g. HIV/AIDS], or the re-introduction of health problems previously brought under control [e.g. malaria]. Not all migration is external. The new economic opportunities, and/or conditions, emerging from the construction of the NT2 Project and
other macro and micro-economic initiatives identified for the SKR can easily induce a considerable internal migration from remote mountainous and rural areas into the district towns, alongside major roads, or near construction sites. Large-scale unplanned and uncontrolled migration will complicate the health situation in the NT 2 Project intervention area, and potentially put a tremendous strain on the existing health care delivery system. The establishment of a NT2 Project polyclinic, with professional personnel employed to take care of the immediate health needs of NT2 Project staff, workers, and their families will alleviate some of these problems. A number of important health issues, however, may be beyond the capacity of the project or the local health care delivery system to effectively address, unless they are anticipated well in advance and appropriate plans and measures put into action before the situation has reached a critical level.

Although it has been suggested that the GOL prohibit the movement of families to accompany 4,200 construction workers to campsites in the NT2 Project intervention area, such a ruling may be impractical or impossible to enforce. Recent anecdotal and documented information indicates that there already are a huge number of Lao young men and women on the move, migrating to areas with perceived better economic opportunities. As such it may be useful to review current labor migration patterns in Khammuane and Savannakhet province. Since the early 1990s a number of factors have conspired to increase the migration of population in the Lao PDR. The opening of borders, the impact of globalization, market demand, widening economic differentials within and between countries, and the growing transnational organized crime and illegal labor recruitment networks have each acted to increase migration. Other factors including natural disaster, unbalanced population growth and strains on education and employment opportunities have also stimulated an increase in both legal and irregular migration—internal and cross-border—as “vulnerable” populations try to improve their life opportunities elsewhere.

5.3 Survey: “Labour Migration”

In 2003 the Ministry of Labour and Social Welfare, Department of Labour, with support from the Committee for Planning and Co-operation, National Statistical Center, conducted a large survey dealing with “labour migration” from communities in Khammuane, Savannakhet, and Champassack. The survey included a total of 6,000 households containing 37,200 people, residing in 300 villages. Four separate questionnaires were included in the survey to obtain information from heads of households, children aged 10-17 years, youth aged 18-25 years, and for returned migrants. The preliminary survey report also included baseline data of Lao migrant workers in Thailand, which was provided by the Ministry of Labour, Thailand.

Some of the highlights of the survey include the following:

- Of the 2,526 individuals who had migrated from their homes, 80.8% migrated overseas. With respect to male migrants, 4.9% migrated inside their district, 4.8% migrated to other districts, 9.5% migrated to other provinces, and 80.8% migrated to other countries. With respect to female migrants, the percentages were slightly different, with more females migrating to other countries. The figures for females included those migrating inside their district (3.5%), to other districts (3.0%), to other provinces (7.5%), and to other countries (86.0%). These figures indicate that the overwhelming majority of migrants perceived that there were better economic opportunities overseas than at locations closer to their respective homes.
With respect to migration to other countries, Khammouane had the lowest percentage of migrants [44.7%]. This included 61.3% of the female and 32.4% of the male migrants. This was considerably different than Savannakhet, where 87.7% of all migrants went overseas [i.e. 91.0% of females and 83.2% of males]. In Champassack 71.5% of all migrants went overseas [i.e. 75.1% of females and 67.7% of males].

With respect to the origin of migrants who went overseas, the survey did not indicate home-district, but rather disaggregated data into three distinct categories, which included urban, rural with roads, and rural with no roads. Regardless of their geographical origin, the vast majority of all migrants went overseas. With respect to those originating from urban areas 87.3% went overseas. This included 91.3% of all female and 82.4% of all male migrants originating from urban areas. Of those migrants who came from rural areas with roads, 75.9% went overseas (i.e. 82.3% of all females and 67.8% of all males migrating from this zone). Of those migrants who originated from rural areas without roads 88.0% went overseas (i.e. 89.7% of all female and 85.5% of all males migrating from this zone).

Thailand was the main attraction for migrants going overseas [81.5%]. Very few went to Europe [0.5%], while the remainder primarily went to other Asian countries [8.3%] or the USA [9.3%]. Although migration from the Lao PDR to Thailand started many years ago, approximately ¾ [73.7%] of the migration to Thailand, took place during the past four years [2000-2003]. These figures suggest that the pace of migration has increased in recent years, and that the potential for future migration, whether domestic or internal, is a well-entrenched phenomenon that may not be subject to governmental attempts at control.

With respect to how migrant workers fared in Thailand, heads of households were asked whether they had received information concerning the livelihood of household members currently working in Thailand, and whether these individuals could be contacted. The results indicated that 67.5% of migrant workers [i.e. 63.2% of males and 70.6% of females] apparently had no problems and were satisfied with their working conditions. A much smaller percentage of migrant workers [3.4%] indicated some problem or hardship [i.e. 3.9% of males and 3.1% of females]. A potential source of concern, however, was the fact that 29.1% of migrant workers [i.e. 32.9 % or males and 26.3% of females] have not sent back any information to their families, nor has anybody in their community received information about their fate or whereabouts. The last series of figures is somewhat troublesome as they may indicate that children, adolescents, and youth have been lured to work overseas, and are now employed in occupations that expose them to physical, emotional, or health risks.

Of the cohort who did not sent any information to their families, the survey suggested a possible correlation between socio-economic status (SES) as well as ethnicity. Of those households listed as being in the lowest 20% SES group, 60% of the migrant workers did not send home any information. For the lower-middle 20% SES group 42.1% of migrant workers did not send information home. For the middle 20% SES group 29.5% did not send home information. For the upper-middle 20% SES group 19.6% did not send home information, while for the highest 20% SES group only 13% did not send home any information. With respect to ethnicity only 27.3% of the Tai-Kadai Group did not send home any information, while for the Austroasiatic Group this fig-
ure was 49.3%. Similarly with respect to place of origin, only 15.4% of those originating from urban areas did not send home any information, compared to 21.9% from rural areas with roads, and 31.1% from rural areas without roads. The provincial breakdown of migrant workers not sending information back home to their families were as follows: Khammouane (43.9%), Savannakhet (32.1) and Champassack (15.4%).

- The above mentioned topic was included in the survey to determine whether “migrant workers are at high risks of being victims of trafficking”, with the assumption that “migrant workers” who have not contacted their head of household, have not sent any information about their livelihood, nor sent any remittances since leaving their village at least a year ago” are a high risk group. Interpreting the data is a little more complex, as there can be other reasons why migrant workers do not contact their families or send remittances home. Two of the most logical causes may be that this cohort contains a large percentage of individuals who are illiterate, or functionally illiterate, and/or whose family members cannot read or write. This cohort may also live in remoter areas of KM/SVK/CPX where routine and reliable mail service is not available, and/or where it may not be safe to send money/remittance through the postal system. This interpretation would correspond to the fact that those having no contact with family members are more commonly found in rural areas without roads, where socio-economic status is very low, and where there are a greater concentration of Austroasiatic ethnic groups. This interpretation should not, however, reduce concern that many migrant workers may indeed be the victims of trafficking, and that effective programs to address this issue need to be established immediately.

5.4 Migration to Thailand

In 2001 and 2003 Thailand attempted to register all foreign migrant workers. The Minister of Labour/Thailand shared this information with the Ministry of Labour and Social Welfare/Lao PDR. The data does not indicate what percentage of Lao migrant workers, in Thailand, actually registered. Nor does it suggest what percentage of migrant workers, from the Lao PDR, had legal work permits. The registration process was established to extend work permits for a 6-month period. The first phase of registration was completed from 24 Sept to 25 Oct. 2001. The second phase was conducted from 24 Feb. 2003 to 25 March 2003. In the first phase a total of 59,358 Lao migrant workers registered [25,771 male and 33,587 female] in 10 categories of permitted work. The registration fees for the first registration cost 3,250 Baht [for health insurance, work permit fee, ID card, and repatriation fund]. During the second round of 6-month work permit extensions only 42,186 Lao migrant workers registered. The registration fee was 1,200 Baht. Only those migrant workers who registered during the 1st phase were allowed to register for the 2nd phase of work permit extensions. The report suggests that the large decline in Lao migrant worker registration, during the 2nd phase, may have come about because individuals changed employers, or they did not wish to pay the registration fee.

Of the 59,358 Lao MW in Thailand who registered for 1st phase, the following table illustrates the type of occupation according to gender:

<table>
<thead>
<tr>
<th>Type of Activity</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
</table>

*Table 4: Percentage of Migrant Workers According to Occupation and Gender.*
One of the serious drawbacks in trying to analyze this data concerns the fact that two of the ten categories are very vague. This includes “special activities with employer” and “special activities without employer”. “Special activities with employers” represents the largest occupation for males, the second largest occupation for females, and the largest category for all Lao migrant workers. One wonders whether this category includes people working in the entertainment sector or commercial sex industry, or in factories with poor working and/or living conditions conducive for physical and mental abuse and/or which promote the trafficking of women and children.

Table 5: The Residence/site of Work of Lao MW in Thailand According to Region.

<table>
<thead>
<tr>
<th>Province/Region</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangkok</td>
<td>33.7</td>
<td>49.6</td>
<td>42.7</td>
</tr>
<tr>
<td>Central Region</td>
<td>21.1</td>
<td>17.5</td>
<td>19.1</td>
</tr>
<tr>
<td>Eastern Region</td>
<td>17.7</td>
<td>8.4</td>
<td>12.4</td>
</tr>
<tr>
<td>Western Region</td>
<td>3.3</td>
<td>1.9</td>
<td>2.5</td>
</tr>
<tr>
<td>Northern Region</td>
<td>3.0</td>
<td>1.6</td>
<td>2.3</td>
</tr>
<tr>
<td>Northeastern Region</td>
<td>12.9</td>
<td>17.9</td>
<td>15.7</td>
</tr>
<tr>
<td>Southern Region</td>
<td>8.3</td>
<td>3.0</td>
<td>5.3</td>
</tr>
</tbody>
</table>

The distribution of Lao migrant workers in Thailand, by geographic region, is consistent with economic opportunities in the country. Hence it is not surprising that most migrant workers were concentrated in Bangkok, the Central, and the Eastern Regions. The Eastern Region has many factories while the Central Region is the major agricultural producing area of the country. The large number of Lao migrant workers employed in the Northeast tend to be distributed in provinces adjacent or close to the Mekong River and/or directly across from Khammouane, Savannakhet and Champassack. Lao migrant workers in the South probably account for those employed by the fishing and related canning industries.

The age of migrant workers is relatively young. More than one-third (38.4%) are 20 years of age or younger, while almost three-quarters (72.5%) are 30 years of age or younger.
5.5 Future Migration Trends

The fact that the migrating population comprised 6.9% of the total sample population, in Khammouane, Savannakhet, and Champassack, suggests that a huge number of people are in the process of migrating from their homes in search of employment and/or educational opportunities. As new economic opportunities are created by the NT2 Project, and other macro and micro-economic development initiatives outlined in the preceding section, it is conceivable that the pace of migration may dramatically escalate, and that migration patterns may substantial change within the next 5-10 year period. This may mean that more migrant workers eventually seek employment opportunities closer to their village of origin. This scenario can have a profound effect on health throughout the Lao PDR, but especially in selected “hot spots” where new types of behavior, different living conditions, and a close mingling amongst previously separated socio-economic and ethnic groups will come into play.

Escalated and expanded levels of migration, especially among adolescents and youth migrating from rural to urban areas, can exert a profound influence on the demographic composition of communities and future population growth rates. These new migration patterns could also radically impact on traditional socio-economic and emotional support systems that sustain rural life, or ensure that linguistic and cultural traditions [including the use of herbal medicines] are passed from one generation to the next. These factors are often overlooked or given a low priority when designing national or regional level long-term economic development plans.

6 PREDICTION OF CUMULATIVE IMPACT

6.1 The 5 Year Scenario

If we were to gaze into a crystal ball, what would the NT2 Project intervention area, as well as adjacent geographical regions, look like in 2010? Would traffic be flowing across the two new Mekong River bridges connecting Savannakhet and Mukdahan as well as Thakhek and Nakorn Phanom? Would large and small factories, restaurants, petroleum stations, entertainment venues and small businesses be blossoming on both sides of the 30 kilometer-long Special Economic Zone, extending from the Mekong River Bridge at Savannakhet to the junction with Route 13 at Seno? Would the East-West Corridor become, in effect, one long stretch of small shops, guest-houses, restaurants, bars, markets, and perhaps new communities providing goods and services to long-distance truck drivers, businessmen, and tourists traveling between Thailand, the Lao PDR and Vietnam? Would the expanded and modernized airport in Savannakhet facilitate a dramatic boom in local and regional tourism, as well as serve as a major outlet for Lao exports? Would Savannakhet, in fact, have started to challenge Vientiane Municipality as the nation’s commercial and economic center?

Would the waterfront area of Thakhek have been transformed into a major tourist attraction featuring French colonial architecture? Would the district towns of Nongbok, Xebanfai, Hinboun, Mahaxay, Nhommalat, Nakai, and Kamkeut [in Bolikhamsay] have grown from large villages or tiny towns into true urban areas serving their respective hinterlands as outlets for agricultural and local handicraft
products, small and large-scale manufacturing centers, and take-off points for nearby eco-tourism? Would the limestone quarry near Mahaxay have been transformed into the nation’s largest producer of cement? Would the reservoir and power station created by the NT2 Project begun to produce electricity for domestic consumption as well as for export to Thailand? And would the new lake created by the NT2 Project have already started to attract international and domestic tourists?

Do we need to clean our crystal ball? Are any, or all, of these scenarios likely to take place within the next 5-year period? If the pace and scope of economic developments in other parts of the Lao PDR, such as Luang Prabang, Oudomxay, Xieng Khouang, and Muong Sing (Luang Namtha), can serve as a realistic gauge, then much of what has been conjured up by our crystal ball can easily exist by 2010. Such dramatic changes, however, will have both positive and negative aspects, which can impact on the physical, mental, and environmental health of communities and individuals. Who, for example, will serve as the labor force to construct the roads, bridges, factories, hotels, restaurants, and other infrastructural inputs outlined above? From which locales, or even countries, will these workers originate? Once construction is completed, who will operate and maintain these facilities or sites? Will migrant workers opt to return to their “original” homes or remain in their new places of residence? Will those who decide to remain, frequently or periodically travel to their original homes to spend time with their families, spouses, and community members? Will these new urban centers attract a continual stream of migrants from the rural hinterlands to serve as an ever-expanding labor-force?

How will the pace of urbanization, in the district centers of Nakai, Nhommalat, Mahaxay, Xebangfai, and Nongbok proceed? Will it be gradual or quite abrupt? Will there be any town planning? Will homes be neatly spaced along lanes lined with fruit or shade trees, or merely constructed and laid-out in any haphazard manner, one on top of the other? Will crowded and new living conditions promote the transmission of vector-borne diseases such as dengue fever and DHF? Will municipal authorities have the resources to construct appropriate and adequate water supply and human-commercial-industrial waste disposal systems? Which agencies will be responsible for monitoring environmental and industrial sanitation conditions? Which agencies or individuals will oversee food safety issues in the local markets? Similarly who will monitor pharmaceutical and medical safety issues in private pharmacies, drug shops, and clinics?

Which agencies will promote traffic safety and enforce traffic regulations? Will there be any traffic lights or traffic signs in these new urban areas, or will large trucks, cars, vans, motorcycles, and bicycles simply compete for available space on the roads and individually determine their own speed levels? Will municipal authorities have adequate resources to maintain roads? Vehicular accidents, causing death, disability, and injury have already reached epidemic proportions in many parts of southeast Asia, and are rapidly becoming a leading cause of morbidity and mortality in the Lao PDR. By the year 2020 WHO estimates that there will be 2.3 million vehicular accidents occurring annually. This would rank as the third most important cause of death globally. Are local health facilities prepared to treat victims of serious vehicular accidents, and are local authorities ready to establish vehicular accident safety programmes?

The above-mentioned scenarios also indicate that within a very short period of time, many communities in what were relatively isolated areas in the Central Region of the Lao PDR, may be in close proximity to cross-border transportation...
networks. In addition to the East-West Corridor in Savannakhet, new road networks in or adjacent to the NT2 Project intervention area [i.e. Routes 8A, 8B, and 12] will link villages in Mahaxay, Nhommalat, Nakai, Hinboun, Boualapha and Khamkeut districts with Vietnam and Thailand in a matter of hours. With new roads being constructed across the border in Vietnam [the Ho Chi Minh Trail], and the proposed bridge crossings at Savannakhet and Thakhek, there is a grave danger that improved cross-border transportation can escalate the momentum and flow in trafficking local women and children, especially from ethnic minority communities. Cross-border transportation networks, and the movement of large numbers of people, can also serve as a convenient means of increasing communicable disease transmission. This is especially relevant for HIV/AIDS and STIs, but can include SARS as well as many other illnesses.

How will the GOL, the NT2 Project, international assistance agencies, and the private sector deal with the provision of health services over the next 5-year period? Will factories, hotels, and other sites establish their own network of clinical and counseling services, or will they decide to provide or subsidize workers with various health insurance schemes? Will there be a mushrooming of private clinics, pharmacies, and drug shops serving the needs of workers, local residents, and those passing through the region? Who will monitor and regulate these facilities? Will government funds be made available for the expansion, renovation, and/or new construction of provincial and district hospitals? At the present time residents of the NT2 Project intervention area are primarily served by a health care delivery system that consists of district hospitals and health dispensaries. These facilities generally have limited supplies of medical supplies and equipment, and existing manpower do not have the pre-requisite competency-based skills to address many current health issues and problems. As such monthly in-patient and out-patient caseloads are low. The district hospitals do not have operating theaters, making it impossible to treat any serious accident or injury, or to provide emergency obstetrical care. These facilities also contain very few highly trained clinicians, laboratory technicians, and public health specialists needed to address existing and/or new health problems that can result from the influx of large numbers of construction workers and migrant laborers settling in and around the NT2 Project intervention.

The Ministry of Health-World Bank “Health Services Improvement Project” (HSIP) will try to address some of these issues, during the period 2004-2009, but the project mandate covers only 30 of the poorest districts in the 8 southern-most provinces extending from the Xaysomboun Special Region down to Attapeu. It includes Khamkeut and Nakai Districts. The HSIP is viewed as a means to foster an integrated district health development approach, assisting district health teams to better plan, manage, and monitor health care delivery in their respective geographical areas. The HSIP will focus efforts on capacity building, development of human resources, health planning and management, and sustainable health sector financing. Some funds will be available for civil works renovations and improvements at selected district hospitals, to allow for a wider range of comprehensive health services. The HSIP, and other routine inputs from the MOH, will not necessarily dramatically increase the number of health dispensaries in the NT2 Project intervention area, nor increase the number of local health personnel.

A key issue is not necessarily who will provide health care to residents, construction workers, or migrant workers in the NT2 Project intervention area, as well as at various locales in the East-West Corridor, the Sunset Corridor, and the new urban centers. It is rather who will closely work with and teach new vulnerable
groups basic life-skills that can promote good health and prevent unnecessary illness and death. Maps included in the "Labour Migration Survey in Khammouane, Savannakhet, and Champassack 2003" illustrate that sample villages included ethnic minority communities located in the NBCA, on the Nakai Plain, in the Nam Theun-Nam Kading-Nam Hinboun Basin areas, as well as sections of Nhommalat, Boualapha, and Mahaxay districts. These maps also pinpointed sample lowland communities in Thakhek, Hinboun, Nongbok, Xebangfai, and other geographic areas of the province included in the study. As mentioned above, the survey found that almost 40% of the migrant workers [i.e. 38.4%] were 20 years of age or younger. How many individuals in this cohort understand the importance of following good personal hygiene practices to prevent illness, or the risks associated with certain behavior that can lead to serious vehicular accidents or the transmission of STIs and HIV/AIDS? Do they know what precautions to take to minimize potential health problems or where to receive information, counseling, and appropriate medical services? What percentage of young women in this cohort, for example, could successfully negotiate safe sex skills including consistent use of condoms with casual or regular partners and/or clients? [i.e. in the case of commercial sex workers]?

The Lao PDR is considered a low prevalence HIV/AIDS country. But is this the actual situation? As of March 2004 of the 98,016 blood samples tested, only 1,212 (1.2%) were HIV positive. Of this number 670 individuals were diagnosed as having AIDS, while 486 individuals died from AIDS. The distribution of HIV positive cases, between 1999-2003, has remained relatively constant, annually fluctuating between 152 and 170 cases. The distribution of HIV cases progressing to AIDS has also remained constant between the years 1999-2003, fluctuating between 93-110 cases per year; while the distribution of AIDS deaths has remained constant between the years 1997-2003, with 62-67 annual mortalities. But what is the source of this data, and does it possibly conceal a much more explosive HIV/AIDS situation lying below the surface?

Although the National Committee for the Control of AIDS (NCCA) has conducted a series of first generation “biological” sentinel surveillance surveys, and more recently launched a second generation of “biological” and “behavioral” sentinel surveillance surveys, there is not any active surveillance mechanism to regularly test “high-risk” and “normal” populations to better gauge the prevalence and incidence of HIV/AIDS. Prevalence meaning the actual number of HIV/AIDS cases existing at a particular point in time, while incidence pertains to the number of newly discovered HIV/AIDS over a finite point in time [e.g. one year]. Most of the existing data derives from “passive surveillance” which are reports sent to the NCCA by provincial health offices. This includes blood samples tested as part of the screening procedures to determine whether donated blood is contaminated with certain pathogens [e.g. HIV/AIDS, certain STIs, Hepatitis B, C, E, etc.]. The data also includes special investigative blood tests of patients who do not recover from prescribed clinical treatment. Blood is collected and examined anonymously, and unless an individual specifically requests the results of the blood test, nobody is informed or counseled about their HIV status.

Anecdotally it appears that the vast majority HIV positive cases, or those progressing to or succumbing to AIDS, had previously worked in Thailand or were spouses of people who worked in Thailand. Thus it is not surprising that the largest number of known HIV positive cases come from Savannakhet (535), Vientiane Municipality (325), Khammouane (95), Champassack (94), and Bokeo (77). Provinces located along the Mekong River adjacent to Thailand. The age distribution of HIV positive cases, between 1990-2003, is principally concentrated in
young adults; with the age cohort 25-29 years having the highest levels, followed by those in the age groups 30-34 years, 20-24 years, and 35-39 years. Precisely the age cohorts that tend to seek employment opportunities in Thailand, and who may decide to return home once they became ill. The gender distribution of known HIV/AIDS cases, during this same time period, is 62% male and 38% female. Heterosexual interactions (82%) is the most prevalent means of transmission, followed by mother-to-child-transmission (2.5%), bisexual interactions (0.8%), blood transfusion (0.4%) and injection (0.3%).

It should be noted that none of the district hospitals in Khammoune have the reagents or the technical training needed to perform HIV serological tests. Health staff have not been trained to counsel HIV positive or AIDS patients, and/or their spouses and immediate family members. Nor have they been trained in the clinical management of AIDS related opportunistic infections, or the provision of HAART (highly active anti-retro viral therapy). These are specific interventions that not only prolong and improve the quality of life for AIDS patients, but also prevent AIDS patients from dying. HAART has dramatically reduced the morbidity and mortality rates for HIV/AIDS in all “developed countries” over the past 7-8 year period. HAART has recently been introduced, on a much more limited basis, in many “developing countries” where it has demonstrated the same impressive results in reducing morbidity and mortality rates associated with HIV infected individuals.

The NCCA included Khammouane, along with Savannakhet and Oudomxay in the ADB sponsored “Community Action for Preventing HIV/AIDS Project” in order to prepare national and local authorities for a potentially explosive HIV/AIDS situation once the NT2 Project commenced. In addition to these three provinces in the Lao PDR, the project also included selected geographical areas of Cambodia and Vietnam.

The project’s main objectives consisted of the following:

- to support a comprehensive set of HIV/AIDS prevention activities in strategically important areas [i.e. “hot spots”] for the transmission of HIV in the region, and
- to strengthen the capacity of national and local HIV authorities and selected NGOs to develop community based prevention and care programmes.

Within provinces the project focused on (1) sites and areas that receive many transient mobile populations or long-term migrants, (2) large construction sites, and (3) source communities for migrants. The project had three components: (1) community-based HIV prevention activities, (2) behavior change communication, and (3) condom promotion. There was also a component to provide care and management of Sexually Transmitted Infections (STIs).

The preceding section has focused on potential cumulative impacts on health caused by economic development, especially urbanization, industrialization and migration. Other cumulative health impacts, directly resulting from NT2 Project interventions affecting irrigation and water supply and sanitation, will be described and dealt with during the review of the specific impact zones.

Rather than discuss all of the potential scenarios, the CIA will make two assumptions. The first is that the “Health Action Plan” included in the recently completed

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“Health Impact Assessment” (Chapter 18 of the Nam Theun 2 Hydroelectric Social Development Plan) will be implemented wherever feasible and practical. The second assumption is that the specific environmental management measures outlined in the “Environmental Assessment for Construction Phase Activities, Information Prepared by Turnkey Contractor” dealing with runoff-control, noise control, dust control, waste control, and rehabilitation will also be implemented wherever feasible and practical.

6.1.1 Nakai Plateau and Nakai – Nam Theun NBCA

The Nakai Plateau and NBCA contains at least five distinct, but interacting, populations that will be directly affected by the NT2 Project. They include the following:

1. The approximately 5,500 ethnic minority inhabitants of the NBCA who reside in 30 scattered villages situated along the tributaries and source of the Nam Theun River.

2. The approximately 5,700 ethnic minorities whose homes will be inundated by the reservoir and who will be resettled in 13 new communities on the Nakai Plateau. A small number of the original group will be relocated to Khamkeut District (Bolikhamxay) near the district center of Lak Sao.

3. The approximately 1,500-2,000 present inhabitants of the Nakai district center, whose numbers can potentially multiply several-fold as camp followers and other migrants converge on this locality to provide goods and services for construction workers, government officials, and others during the five-year construction period.

4. The approximately 4,200 construction workers who will work in the following 12 camps: the Nakai Dam Area Construction Camp (1), the Oudoumsouk Work Camp Zone (2), the Power Station Work Camp Zone (4), and the Downstream Work Camp Zone (5). Most of these camps are actually located below the Nakai Plateau, but it is more appropriate to include them in this geographical section than in that designated as the “Xebangfai Basin and Surrounding Districts Zone”.

5. The present inhabitants of the Nhommalat district center, whose numbers can also multiply several-fold as camp followers and other migrants converge on this locality to provide goods and services for construction workers, government officials, and others during the five-year construction period. Being located at the junction of Routes 8B and 12, the district center will also be affected by cross-border commerce and tourism between the Lao PDR and Vietnam, and perhaps Thailand as well. The Nhommalat district center is actually located below the Nakai Plateau, but it is more appropriate to include in this geographical section than in that designated as the “Xebangfai Basin and Surrounding Districts Zone”.

The NCBA: This area stretches from the foothills adjacent to the Nakai Plateau up through the mountainous forests bordering Vietnam. These communities are generally considered outside the range of actual or potential effects of the NT2 Project, as they are situated above the plateau, and far away from the various construction sites, worker camps, and resettlement villages. This does not mean, however, that health conditions in these communities will not be affected during the initial five-year construction phase or at different periods during the operation of the NT2 Hydropower Project. A great deal will depend upon to what extent community members voluntarily decide, or are forced by external circumstances,
to interact with populations living, and developments taking place, on the Nakai Plateau. The NBCA represents one of the more isolated geographical areas in Khammouane. It has few health dispensaries, and villagers have limited access to appropriate health care services during times of emergency or serious illness. It is a geographical area where women and young children are most vulnerable to potential life-threatening illnesses or conditions.

There are several realistic scenarios that will take place with respect to the NBCA. The first is that its ethnic minority inhabitants will have minimal interaction with other populations and events taking place on the Nakai Plateau. Villagers will continue to visit relatives and co-tribesmen in communities scheduled for resettlement, and occasionally visit the district center to sell forest products and to buy essential household commodities. Very few members, however, will actually migrate to the Nakai Plateau or to other geographic areas participating in macro and micro-economic developments [e.g. the East-West Corridor]. This will mean that the NT2 Project, and other external developments, should exert a limited impact on health in the NBCA. Health status can improve if more and better trained health personnel are deployed to existing health dispensaries, or if district hospital and health office personnel make more frequent outreach visits, and/or conduct regular in-service training opportunities for health dispensary workers, TBAs, VHV, and village malaria workers. There is a greater chance, however, that the district health team will soon become pre-occupied addressing new health issues and problems caused by a burgeoning population in and around the district center, as well as by providing increased supervisory and outreach services to the communities scheduled for resettlement. Under this scenario the precarious health situation for women of reproductive age and young children in the NBCA may actually deteriorate.

The second scenario is that inhabitants of the NBCA will have medium level interaction with other populations, and events taking place on the Nakai Plateau. This may include families wishing to move closer to their co-tribesmen once they observe the newly constructed resettlement communities and other social services associated with this development. Others, perhaps including adolescents and young adults, may be attracted to the district center or to ad-hoc settlements springing up near construction camp sites, where they can be employed in a wide range of occupational pursuits. Those finding employment will be able to financially support their families, and this may bring about improvements in health. On the other hand some of these new migrants may be lured into activities which put their health at-risk. Some may be forced to work long-hours and not fed properly, while others may be induced to engage in sexual activities that put them at risk for STIs and HIV/AIDS. For those who cannot successfully find employment locally, there is the chance that they may be encouraged to seek work further from their homes; in one of the nearby district towns, in factories/establishments in the SEZ or the East-West Corridor or in Thailand. The further one moves from home, the greater the chance of being caught in the web of trafficking activities which can have serious consequences on physical and mental health. There is, of course, a plus side to moving to the district center. Migrant workers from the NBCA may have access to more food as well as more nutritious meals. They may also be less exposed to certain communicable diseases and adverse health conditions. And they may have better access to emergency and/or routine health care provided by the district hospital, private clinics, pharmacies or drug shops.

The third scenario is that by 2010 a large number of people inhabiting the NBCA have decided to migrate elsewhere. This may include entire communities, individual households, but more than likely it would consist of specific age groups.
This exodus would probably include many adolescents and young adults, who are not as spiritually or emotionally tied to their communities. Many may also feel that it is easier to earn a living in some urban setting than to eke out a very difficult existence on upland paddy fields or gathering forest products near their homes. Most of this cohort would probably initially try to find work in and around Nakai, but their numbers may be too high to absorb, or they may have learned from co-villagers that better opportunities exist in the lowlands along the East-West Corridor or across the Mekong River in Thailand. Not having acquired many “life skills” outside of their remote villages, these young men and women will be particularly vulnerable to becoming part of an “under-class” of workers surrounded by poor working and living conditions, or being trafficked for illegal purposes that will put their health at risk. Many migrant workers will obviously find their new lives a great improvement over what they previously experienced in remote villages. Some will find life-partners, settle down, and establish families. Others will become disoriented and alienated in unfamiliar or hostile environments. This may lead to depression, alcohol or drug abuse, or other destructive anti-social behavioral problems. Depending on individual circumstances a certain percentage of this migrating cohort will be exposed to STIs and HIV/AIDS. Lacking proper understanding about the nature of these illnesses, or how they can be treated or prevented, may inadvertently lead to horizontal or vertical transmission of HIV/AIDS to one’s spouse or newborn infant. For those remaining in the NBCA life will become more difficult. There will be less adolescents and young adults able to share the burdens associated with subsistence farming and gathering. Many of the elderly, who may also be responsible for taking care of young children, will be under physical and emotional stress. This may be exacerbated by the fact that some of their grown children do not send home any news about their new lives and/or any remittances necessary for the family’s daily survival. Accordingly a certain percentage of those remaining in the village may become depressed.

The Resettlement Communities: Seventeen ethnic minority communities, currently residing on the site of the proposed reservoir, will during the 5-year construction phase be resettled. For many of these communities resettlement involves a relocation of less than 5 kms from their present homes. This move, however, may represent quite a momentous change in their daily life-styles. On the surface the health status of ethnic minorities, participating in the resettlement scheme, should substantially improve if the pilot village of Nong Boua is a representative “model” of what will eventually take place. New housing design should have a positive impact on general health conditions. All households will be resettled into a relatively spacious home, containing separate living and cooking areas. The homes are designed to reduce rain and cold weather from entering the premises, as well as to promote better cross ventilation. Each home is elevated off the ground; which will reduce direct or close human contact with many types of insects, rodents, reptiles, and other animals that can potentially cause illness. Water and environmental sanitation conditions will dramatically improve. Each home will have its own source of safe potable water for drinking and household use, as well as a water-seal latrine. The latrine site is large enough to use as an enclosed bathing area, and this should promote a higher level of personal hygiene. These two innovations, if used and maintained properly, should dramatically reduce the prevalence and incidence of water-borne diseases and intestinal parasitic infections, one of the leading causes of morbidity and mortality on the Nakai Plateau. Each household will also be provided with insecticide treated bednets which, if properly maintained, used and re-impregnated, will reduce the prevalence and incidence of malaria as well as infestations and illnesses caused by mosquitoes, lice, bedbugs, and fleas.
The project will support the construction of approximately 3 new health dispensaries to cater to the health needs of the resettlement communities. Each health dispensary will serve 3-5 communities, depending upon the population size of the “catchment area” and traveling distance to the health facility. A system of regular mobile supervisory teams, from the district hospital and district health office, will provide technical and logistical support to the new health dispensaries as well as specific health services to the target population. As each resettlement village will be connected to Route 8B, by a small feeder road, villagers will be able to more conveniently travel to the district hospital in times of emergency. The project will also provide support for the establishment of irrigated rice-fields, horticulture production, and other occupational training and extension services to residents of the resettlement communities. These interventions should increase food production and allow families, especially women of reproductive age and young children, to have access to more nutritious and well-balanced diets. The project anticipates that resettlement communities will be able to market their horticultural products in the Nakai district center as local demand increases with the influx of construction workers, camp followers, and other migrants settling in and around the Nakai Plateau.

The resettlement of communities rarely materializes as originally planned. There are usually many unforeseen forces that can interfere or disrupt this process. A major issue, raised in several of the NT2 Project documents, concerns the quality of the soil in the resettlement area. Will it, even with irrigation, produce the expected rice and horticultural yields? Will insects, rodents, and other pests destroy part of the crop? Will farmers, even against the advise and support of agricultural experts and extension workers, decide within a relatively short time to use pesticides and herbicides to maintain or increase production levels, which at the same time put producers and consumers at risk to a number of serious health problems? Will these pesticides and herbicides be properly stored, or will they be indiscriminately kept in and around the house, in easy reach of young children? Will the runoff from pesticide use eventually reach nearby streams and other waterways used by people outside the resettlement communities?

Another issue of potential concern, is the extent to which people in the resettlement communities will interact with other populations, and developments taking place on the Nakai Plateau. Although they have been considerably less isolated than many of the communities in the NBCA, villagers will now be in greater proximity to the district center, as well as ad hoc settlements that may emerge near camp sites. Will this development encourage a significant number of resettlement community members, or perhaps specific age groups such as adolescents and young adults, to seek employment outside their villages? What is the NT2 Project’s policy on hiring “local people” for unskilled tasks as construction workers, cleaners and sweepers of dormitories, kitchens, canteens, etc.? Will more and more adolescents and young adults venture on into town during the agricultural off-seasons and eventually find employment in restaurants, market places, shops, or entertainment venues serving a large work and migrant labor force? Will some of these individuals, originating from the resettlement communities, eventually decide to seek their fortunes in the Nhommalat or Mahaxay district centers, and/or gradually further away along the East-West Corridor or in Thailand? The “Labour Migration Survey in Khammoune, Savannakhet, and Champassack 2003” indicated that survey villages included communities from the Nakai Plateau and NBCA. Is migration already an aspiration of many adolescents and young adults, and if so to what extent will urbanization and the NT2 Project accelerate this process?
The Nakai district center, as well as ad hoc settlements that may spring up near camp sites, may potentially become major focal points for the transmission of STIs and HIV/AIDS. The district hospital has, over the past year, begun to see and treat more STI cases, but these relatively small numbers may only represent the tip of the iceberg, as local people are embarrassed and accordingly seek treatment at private pharmacies or tiny drug shops. Knowledge and understanding of the dynamics involved in transmitting and preventing STIs, and HIV/AIDS, still remains low amongst many at risk individuals. Will adolescents and young adults from the resettlement communities on the Nakai Plateau represent one of the high-risk groups for these new afflictions? Who will provide on-going health education and/or counseling concerning STIs and HIV/AIDS to potential migrants or seemingly “low risk” groups who remain in the resettlement communities?

The current STI and HIV/AIDS prevention strategies focus on providing information to perceived high-risk groups, such as long-distance truck drivers and women working in the entertainment industry, as well as encouraging these individuals to use condoms. However there may soon be thousands of people at risk to STIs and HIV/AIDS in and around the Nakai district center. Who will provide the information and/or supply the condoms? Who will provide pre- and post-counseling as the situation begins to warrant the routine serological testing of blood for suspected HIV/AIDS cases? Who will provide out-patient, in-patient, or home-care services to people starting to exhibit signs and symptoms indicative of opportunistic infections associated with AIDS? Will treatment strategies eventually include the provision of HAART (highly active anti-retro viral therapy) and long-term follow-up care? Who will take care of HIV/AIDS patients once they become ill, and start returning to their homes from other districts, other provinces, or neighboring countries? It should be noted that the raging HIV/AIDS epidemic in Thailand began in the northern region. It was, to a great extent, sparked by rural migrant laborers descending upon construction camps in and around the provincial center. Rapidly changing socio-economic conditions and behavioral practices at these sites, amongst young men and women, established the foundation upon which the epidemic was fueled. A large percentage of the young men and women working and living at these sites soon became infected with HIV/AIDS. In a very short period of time the infection was subsequently transmitted to new partners or to spouses in their home communities. The entire time frame involving the initial HIV infection, progression to clinical AIDS, and finally to death frequently took considerably less time than that which is designated as the NT2 Project “construction phase”. Complacency should not be a practical or ethical option.

The influx of workers and other migrants, as well as the work schedule for the construction of the resettlement communities, reservoir, power station, and other infra-structural inputs will dramatically increase the number of vehicles, of all types and sizes, on the roads in and around the Nakai Plateau. As such the frequency and severity of vehicular accidents will dramatically increase. Resettlement villagers will comprise an especially vulnerable high-risk group for these types of injuries. In the past most villagers did not live near any roads. Even during journeys to the district center, they probably encountered few, if any, motorized vehicles on the road or in town. Most of those scheduled to be resettled, regardless of age, have no idea about traffic rules and regulations and can easily be severely injured or killed by the increased volume of road traffic that will include vehicles traveling at high speeds. Living closer to the district center, some resettlement villagers may eventually buy bicycles or even motor scooters to transport products they wish to sell in the markets or to commute to jobs in town on a daily basis. Unless a widespread traffic education campaign is enacted,
complemented by rigid enforcement of traffic laws, traffic accidents may become one of the leading causes of morbidity and mortality for certain age-groups living in resettlement communities, as well as for the Nakai Plateau in general. The district hospital will need to be renovated, and appropriate health personnel trained, to take care of trauma, orthopedic, and head injuries.

As the ethnic minority communities, included in the resettlement scheme, begin to have greater contact with the Nakai district center, and the outside world, the incidence of stressed-related and other mental health problems will undoubtedly rise. Many of these potential problems will become more pronounced only after 2010, when all resettlement communities have moved to their new homes. There will nevertheless be a moderate level of anxiety in many families as “generation gaps” develop between older members of households and adolescents and young adults attracted to the manners and “alien” lifestyles found in the district center, and ad hoc settlements near camp sites. A rise in mental health problems may also come about if migrants from the resettlement communities start returning to their home villages after becoming ill with HIV/AIDS. Families of afflicted individuals may become ostracized and excluded from traditional and cultural events. Daily social intercourse amongst neighbors may be disrupted, and some families may suddenly find themselves faced with overwhelming burdens for which they are not prepared. The social development component of the NT2 Project needs to be take pro-active measures, rather than wait until serious problems arise, if they are to address these and other issues, that can potentially create new divisions or social tension within communities as well as within individual households. Health education will not be sufficient. Specific ameliorative mechanisms will have to be put into place to establish creative emotional support networks aimed at dealing with an entirely new set of circumstances. A major challenge will be to enlist the support of traditional leaders and practitioners, rather than merely relying upon the perceived strategies, advice and support of public and private sector agencies.

The Nakai District Center: The Nakai district center is presently a small town consisting of government offices, the district hospital-health center complex, some schools, a Buddhist temple, shops, restaurants, and a market place. The district center contains about 1,500-2,000 residents. By 2010, however, this tiny town, which in many ways resembles a large village, may become a substantial urban center. A great deal will depend upon the size and composition of the new migrants. Will, for example, this primarily consist of small entrepreneurs from provincial and district centers in Khammouane, or neighboring provinces, hoping to earn a decent living by providing basic goods and services needed by the influx of a large labor force? Or will it include a much more diverse group of individuals, including those involved in both small and large-scale entertainment venues? Will local authorities allow these enterprises to expand within the present boundaries of the district center, or will they be encouraged or required to be located away from the municipal center? Will certain types of establishments be discouraged or prohibited by law? Will family members be allowed to accompany the construction workers? Will some or most of them settle in and around the district town, or will they establish ad hoc settlements closer to the work camps? Will workers be discouraged or prohibited from making frequent trips, during their free time, to the district center? Will there be a large influx of women to work in entertainment venues frequented by construction workers, government officials, and others? Will these women gradually come from some of the ethnic communities in Nakai and neighboring districts?
Rapid and unplanned population growth can exert a negative impact on health. Over-crowded living and working conditions are ideal foci for the spread of a wide range of communicable diseases. Lack of safe and clean sources of potable water and the proper disposal of human waste serve as potential “hot spots” for outbreaks, or simply an increased incidence and prevalence, of water-borne diseases. These same living conditions are also conducive for the spread of respiratory illnesses, and a number of serious vector-borne diseases. Public health authorities will need to devote considerably more time and effort to monitor food safety issues in an environment that includes many restaurants, markets, and small food stalls. This will include rodent and insect control as well as garbage disposal. A similar approach has to be undertaken to ensure the safety and quality of medication sold in pharmacies and drug shops.

Unlike the construction workers, those migrating to the Nakai district center will not have to undergo any physical examinations prior to their arrival. As such they may inadvertently introduce new, or perhaps re-introduce communicable diseases previously brought under control. This is especially relevant for malaria, as Nakai district is truly one of the showcases in the National Malaria Control Project. With the distribution of insecticide treated bednets to nearly all households in every community in the district, as well as the training of village health workers and volunteers, to provide early diagnosis and treatment for suspected/confirmed malaria cases, malaria has ceased to be a leading cause of illness and death. The district cannot afford to drop its guard, and continued efforts need to be implemented to ensure that this deadly killer does not return and re-emerge as a major health problem. However some of the new migrants to the district center may originate from geographic areas where malaria was never a health problem. As such they may have no experience with, or appreciation for the importance of, using bed nets and/or ensuring that these items are properly maintained, replaced, and re-impregnated. The Anopheles mosquitoes capable of transmitting malaria live in a number of environmental niches not far from the district center. Planned irrigation schemes may to some extent actually increase the number of these mosquito vectors of disease. Hence it is essential that the main components of the malaria control programme in Nakai continue for the immediate future. Who will take the responsibility to educate these newcomers to the district center about the dangers of malaria? Who will ensure that they purchase and properly use insecticide treated bed nets? Who will monitor their use?

Dengue fever (and DHF) is potentially a more serious problem than malaria. This mosquito-borne disease is usually found in urban, and semi-urban, rather than in rural areas. The mosquito vectors usually breed in stagnant water collecting in various receptacles and containers, such as water storage jars, discarded automobile tires, flower pots, etc. Crowded living conditions, with poor environmental sanitation, can lead to explosive epidemics. For those infected with DHF, the onset of serious complications leading to death can take place in a very short period of time. DHF generally affects young children. Are Nakai district hospital staff presently capable of clinically managing DHF cases? Are Nakai district health officials prepared to implement DHF epidemic prevention and control measures, including the use of chemical larvicides?

The rapid growth of the district center is bound to lead to conditions which promote increased casual use of alcoholic beverages and perhaps “recreational drugs” that will alter perceptions and lead to high-risk behavior. The two most dangerous at-risk behaviors will be “driving” and “casual sexual encounters”, while under the influence of alcohol or drugs. The first situation will undoubtedly
lead to an increase in the frequency and severity of vehicular accidents, including death, for drivers, passengers, pedestrians and others on the road. The second situation will lead to a greatly increased risk of contracting STIs and HIV/AIDS as those under the influence of alcohol and drugs often do not take necessary preventive precautions, such as using condoms. As mentioned above, health education campaigns and the promotion of condoms, are insufficient measures to reduce high-risk behavior. A much more comprehensive and pro-active approach needs to be undertaken. This will be discussed in further detail in the sections dealing with “business as usual” and “best practices”.

Worker Camp Sites: During the 5-year construction phase a series of 12 camp-sites will be established, for 4,200 workers, at various localities in Nakai and Nhommalat districts. Lao workers will probably comprise the largest contingent in the work force, but professional and skilled workers will also be employed from other countries. With respect to health, a great deal will depend upon whether or not large numbers of camp followers move close to the camp sites. Will this group include spouses and children of the construction workers, or will it primarily be those individuals servicing the various needs of the work force? Either category will create additional demands upon the existing health manpower stationed at the district hospital and district health office. Comprehensive preventive [e.g. immunizations], promotive [e.g. ante-natal care], and curative services will have to be provided for these people. This situation, as mentioned earlier, could indirectly have a negative effect on the health status of ethnic minority communities in the resettlement area or in the NBCA.

Crowded living conditions will, as indicated above, promote the transmission of communicable diseases and serve as potential focal points for the outbreak of explosive epidemics. Unlike the NT2 Project labor force, who are required to undergo physical examinations and perhaps treatment prior to actual employment, camp followers will not follow such procedures. As such it is conceivable that new health problems can be introduced in and around the district center and perhaps onto the Nakai Plateau; depending upon the level of interaction between the various populations. Will it be practical to restrict or prohibit camp followers from establishing ad hoc settlements near camp sites? For those camp sites located in remote areas or on inhospitable terrain, this may be a possibility. But whatever the eventual outcome, it is unrealistic to expect a large work force, receiving regular salary payments, to spend all or much of its free time in project dormitories or canteens. Traveling to and from the district town on a motorcycle, under the influence of alcohol, may in fact be more hazardous than frequenting a small food stall, selling liquor, and then walking back to the work camp dormitory. A key challenge will be how to encourage the work force to relax, when off duty, but at the same time avoid unnecessary excesses that includes high-risk behavior.

The Nhommalat District Center: Although technically located below the Nakai Plateau, it makes more programmatic sense to include the Nhommalat district center in this section as the potential cumulative impacts on health, as well as “business as usual” and “best practices” strategies, are quite similar to that of the Nakai District Center. The Nhommalat district center is located close to the large work camps near the power station and downstream channel. It is also situated at the confluence of a newly expanded road junction, of Route 8B and Route 12, connecting Thakhek with Vietnam. This will put the district center within two hours traveling time of the Vietnamese border, linking it to cross border trade as well as possible international trafficking activities. In addition the Nhommalat district center is also situated closer to the proposed cement factory scheduled to
open in Mahaxay district. As such Nhommalat town may attract a larger migrant population than the one envisioned for Nakai. Hence the same basic scenarios, concerning crowded living conditions, increased risk of vehicular accidents, the introduction or re-introduction of potentially dangerous vector-borne diseases, and the creation of a serious STI and HIV/AIDS situation propelled by urbanization, migration, and at risk behavioral practices apply here as well.

On a positive note, the MOH has recently indicated that external funding may soon be available to construct a new spacious district hospital just outside the Nhommalat district center, along Route 12. This facility would serve as an inter-district facility, supporting the health care delivery network in both Nakai and Mahaxay districts. This development has obvious health implications for the NT2 Project intervention area.

6.1.2 Xebangfai Basin and Surrounding Districts

The potential cumulative impacts on health in the Xebangfai Basin and surrounding districts is expected to be considerably different than that of the Nakai Plateau and the NBCA. Most of the direct impacts will be felt only after the Commercial Operation Date (COD) in 2010, when water is released from the reservoir, passing through the power station, regulating and holding ponds, and downstream channel on its way to the Mekong River. The “Nam Theun 2 Project Xebang Fai Strategy Paper” indicates that 89 villages, located along four different sections of the Xebangfai Basin, will be affected by the NT2 Project. This will include 7,096 households containing approximately 40,000 people.

There are several potential impacts of the increased water-flow, in the Xebangfai Basin, which can impact on the health status of local residents. The first, and probably the most important, from a purely health perspective is the increased amount of sediment in water caused by bank erosion in the early stretches of the river. This may reduce the quality of potable water used for drinking, bathing, and other household purposes, causing gastro-intestinal illnesses as well as skin problems. Increased water-flows, especially during the dry season, will undoubtedly improve irrigation potentials and annual rice yields, but they may adversely affect fisheries and gardens in the river and along the riverbanks. This obviously can affect household income and nutritional levels.

The changes in water levels, in and around riparian communities, may influence the prevalence and incidence of rodent and vector-borne diseases such as leptospirosis, malaria, dengue fever, and opisthorchiasis. This concern is most relevant for dengue fever (and DHF), where standing water serves as an excellent breeding ground for the mosquito species capable of transmitting this potentially life-threatening disease. During 2002-2003 large outbreaks of dengue fever occurred in Xebangfai and Nongbok districts. Will the promotion of an additional dry season rice crop, aided by NT2 Project irrigation schemes, cause dengue fever to proliferate and become an endemic health problem to this region? Another potential health issue is the use of pesticides and herbicides in rice-fields and vegetable gardens. Will improved road networks stimulate the production and sale of agricultural products for expanding markets in nearby district and provincial urban centers? What will be the health impacts on producers and consumers? Increased water levels will also probably cause more drowning accidents, especially among young children playing or bathing in the rivers, as well as people simply attempting to cross the river.
The potential direct impacts on the health of the people living in the Xebangfai Basin and surrounding districts are considerably less dramatic than what is predicted for the Nakai Plain and NBCA. There will not be a tremendous influx of workers and other migrants, possible numbering as high as 5,000-10,000 people, inundating the small district towns or surrounding areas in a relatively short time frame. On the other hand, being located closer to the macro and micro-economic developments prophesized by our “crystal ball”, the district centers of Mahaxay, Xebangfai, and Nongbok may experience substantial growth. These districts may witness a massive external exodus of rural adolescents and young adults to the East-West Corridor, the Savannakhet SEZ, nearby Thailand, or even to the work camps and district centers on the Nakai Plateau. Will these migrations be on a temporary or permanent basis? What potential demographic impact will these migration patterns have for “home communities” by the year 2025? Will there in fact be a “next” generation of farmers?

Some of the same scenarios, listed above for the Nakai Plateau and NBCA, are also relevant to the Xebangfai Basin and surrounding districts. By 2010, as the valves on the Nam Theun 2 Reservoir are being opened, a number of cumulative impacts on health may already be in progress. These may include increased exposure to STIs and HIV/AIDS, vehicular accidents, anxiety and other forms of mental illness, and specific communicable diseases caused by new environmental and demographic conditions. By 2010 our crystal ball has predicted that Mahaxay may become a manufacturing center, with perhaps the largest cement factory complex in the nation. Will the dust from this factory become a major environmental health issue locally or for the region? Mahaxay will also be located on the cross-roads of thoroughfares leading from Thailand to Vietnam, as well as linking the central part of Khammouane to the East-West Corridor. The Xebangfai district center, presently situated on Route 13, is already directly linked to Thakhek and the Savannakhet provincial center, will undoubtedly grow in size by 2010. The Nongbok district center, sitting on the banks of the Mekong River just across from Thailand, is connected to Thakhek by a grated unpaved road. But this small district town, and the surrounding area, could easily become a major tourist center if some of the current economic development plans are put into operation. Will local authorities be prepared and capable of dealing with an entirely new series of public health issues caused by economic development, urbanization, and migration?

6.1.3 Nam Theun, Nam Kading and Nam Hinboun Basins and Surrounding Districts

The direct, as well as cumulative, impacts in the areas referred to as Zone 4 (Nam-Theun Downstream to Theun-Hinboun Headpond), Zone 5 (Theun Hinboun Dam to the Mekong) and Zone 6 (Road 8B “Lak Sao Road” and “Phou Phako Quarry”) are expected to be minimal. This is especially true with respect to health. At the present time there are no established villages or settlements in Zone 4, due to topography and difficult access. The impacts from the reduced flows in the Nam Theun between the reservoir site and the Theun Hinboun Dam will primarily be limited to riparian vegetation, wildlife, and fish. This may mean that the livelihood of a small number of fishermen and hunters, using this area, is affected. Downstream of the Theun-Hinboun Dam (Zone 5) the NT2 Project has no effect on minimum water flows. Flows downstream of the Theun-Hinboun are predominantly dependent upon the operation of the Theun-Hinboun power station. It is expected that the impact on individuals living along the Kading River, to its confluence with the Mekong, will be negligible. Zone 6 presently has few inhabitants. However a large work camp near the quarry at Phou Phako, will be established for construction of the dam site and Road 8B north to its junction with
8A near Lak Sao in Khamkeut district in Bolikhamsay. This work camp, and possible ad hoc camp follower settlements that may spring up here, are already included in the generic issue of camp-sites presented in the section dealing with the Nakai Plateau and NBCA. In brief, except for camp-sites and possible camp follower settlements, there will not be any important cumulative health impacts in the Nam Theun, Nam Kading and Nam Hinboun Basins and Surrounding Districts by the year 2010.

6.1.4 Mekong River Basins

There are not expected to be any immediate or cumulative impacts on health originating in the NT2 Project intervention or adjacent areas that will affect the Mekong River Basins. Even if the increased use of pesticides and herbicides cause local health problems in selected communities or sections of the NT2 Project intervention area, this development should not directly influence the health of humans and other living organisms along the greater Mekong River Basin. Similarly hydrological or macro and micro-economic developments taking place in the Mekong River Basin should exert no cumulative impact on health in the NT2 Project intervention area.

6.1.5 Neighbouring Areas in Vietnam and Thailand

The most logical potential cumulative impacts on health, concerning the NT2 Project intervention area and adjacent districts with neighbouring areas in Vietnam and Thailand, primarily concern cross border commerce, tourism, labour migration patterns, and perhaps the trafficking of women and children. The construction, and expansion, of new roads and bridges linking Thailand and Vietnam, will pass through and around the NT2 Project intervention area. Workers, businessmen, tourists, and a large transient mobile population of rural adolescents and young adults may be inter-acting in greater numbers and with increased frequency. Will any Thai and Vietnamese adolescents, young adults, or even women and children become part of the “entertainment industry” near the work camps of the NT2 Project or in the Savannakhet SEZ or East-West Corridor in Khammouane and Savannakhet? Will lowland and ethnic minority Lao adolescents, young adults, or women and children find themselves in the “commercial sex” industry in Thailand and Vietnam? How will the increasing number of Thai and Vietnam tourists and businessmen, stopping off in the district centers in the NT2 Project intervention area and neighboring districts, stimulate the growth of local “entertainment venues”? How will these developments influence the incidence and prevalence of HIV/AIDS & STIs in the Lao PDR and neighbouring countries? What will be the effect of large trucks, zooming along Routes 8A, 8B, 9, and/or 12 at high speeds, between Thailand and Vietnam, on the frequency and severity of vehicular accidents and deaths in local communities? Will the economic opportunities caused by the opening of the East-West Corridor, and new road links between Thailand-Thakhek-Vietnam, encourage families, and/or entire communities, to relocate to sites along roadsides, providing various goods and services to truck drivers, tourists, businessmen, and whoever else passing through their community? How will this unplanned village growth affect the transmission of communicable diseases as well as local health status?

The NT2 Project infrastructural components themselves, that is the construction of the reservoir, power stations, and downstream channel, should not have any direct impact on the health of people living in neighbouring Thailand or Vietnam.
6.2 The 20 Year Scenario

If we were to once again gaze into our crystal ball, what would we see in the Year 2025? An intrinsic problem with our crystal ball, is that although it is capable of making amazingly accurate predictions, it only has a 10-year warranty! It will, however, come as no surprise that the Lao PDR of 2025 does not resemble that of 2004 or even 2010. Momentous physical and spiritual changes may have taken place across the length and breadth of the nation. A majority of the population may live in urban or semi-urban areas, rather than in the rural countryside. An intricate network of roads will crisscross the country from north to south and from east to west. There will more international cross-border checkpoints with Thailand, Vietnam, China, Cambodia, and Myanmar. The tourism sector of the economy will have grown tremendously. The same could be true for manufacturing and industry. Many former visitors and residents, who have not returned to the Lao PDR since 2010 may truthfully claim that they can no longer recognize the place. Some of this group will be markedly impressed by what has taken place in the last 15 years. Others may bemoan the scope and pace of modernization, and its apparent affects on how the Lao treat one another or visitors to their country.

But our main concern is what has taken place in the NT2 Project intervention area, and adjacent districts that underwent macro and micro-economic developments between the years 2010 and 2025?

6.2.1 Nakai Plateau and Nakai – Nam Theun NBCA

Nakai district may have changed dramatically. Although the size of the district center may have remained relatively the same, a spectacular real estate and development boom may have occurred along the shores of the Nam Theun 2 Dam. Dozens of hotels, guesthouses, and even houseboats may have been constructed to accommodate the thousands of tourists who annually visit this 70-kilometer long recreation area. The facilities range from low-scale inexpensive guesthouses for “back-packers” to exclusive five-star luxury hotels and spas for the wealthy. Restaurants, bars, gift-shops, and karaoke establishments are sparsely situated along certain sections of the shoreline, but in general zoning laws have kept their numbers in check, and local authorities make sure that illegal activities do not take place in this area. The government, as well as the private sector, has successfully promoted eco-tourism in the NBCA, to the north of the reservoir. Registered companies take small groups of tourists to visit the mountains and forests of the NBCA. Most tours consist of short 1-3 day treks, with overnight stops at specially designated camp-sites. Other tours allow tourists to spend up to a week visiting and observing daily life in selected ethnic minority villages. These tours allow villagers to earn a decent income selling handicrafts and forest products. Residents of the resettlement villages have also benefited from the economic opportunities created in Nakai. Some have prospered producing fresh poultry, livestock, fish, and fruits and vegetables consumed in the district center, and for the hotels and restaurants along the reservoir. Many young people from these communities, as well as from the district town, are employed in the tourism industry along the lakefront. Some ethnic minority villagers, from both the resettlement communities as well as from the NBCA, have been hired to perform traditional dances and rituals for tourists. At the same time some of the smaller remote ethnic minority villages in the NBCA may have merged with neighboring communities, as a result of large-scale migration of younger community members or due to the high numbers AIDS related deaths described below.
Health conditions throughout Nakai district may have dramatically improved. Malaria cases are rare events. Dengue fever occasionally breaks out in epidemic waves every couple of years, but the hospital can deal with all cases, and there have not been any deaths in several years. The improvement in public water supply systems and the use of latrines have dramatically reduced the number of illness caused by water or food-borne illnesses. There has not been a death from diarrhea in more than 5 years!

A major development may be that HIV/AIDS is no longer a serious health problem. The discovery of a clinical “cure” for AIDS, during the period after 2010, has meant that this one-time dreaded plague has been transformed into simply another communicable disease. However approximately 10-15 years ago the HIV/AIDS epidemic swept through many ethnic minority communities, as well as the district center, killing hundreds of individuals in its path and destroying the social and economic fabric of many families. The epidemic killed many young adults, as well as children under the age of five years who were originally infected by their HIV positive mothers during pregnancy or shortly after delivery. For several years it seemed as if there was an AIDS-related funeral every week. Many young children became orphans, and elderly grandparents were often the only relatives left to take care of these youngsters. In addition to the intense emotional stress caused by the epidemic, many families lost their economic base of support when their breadwinner died from AIDS. A recent worrisome trend, however, is that many adolescents and young adults feel that since STIs & AIDS are now curable ailments, there is little incentive to use condoms. Another trend is that poor treatment compliance has resulted in new strains of certain STIs becoming resistant to antibiotics.

The high level of vehicular accidents has not declined on the Nakai Plateau. During the past 10-years it has consistently been the leading cause of morbidity and mortality. Traffic safety campaigns have been ineffective. High levels of alcohol consumption, and an apparent disregard to follow traffic rules, cause many preventable deaths or crippling disabilities each year.

Changing diets, and lifestyles, have also begun to alter the picture of morbidity and mortality. Communicable diseases have become relatively unimportant compared to non-communicable diseases associated with chronic ailments, aging, and new behavioral patterns. Diabetes, circulatory diseases and heart ailments, cancers, psychological problems including depression and suicide, and even obesity are becoming more prominent in Nakai. Many health workers at dispensaries and hospitals, however, have not been re-trained to deal with these “new” health issues. Another important recent development is that private clinics and pharmacies have sprung up throughout the district town as well as along the reservoir. The private sector has now replaced the public sector as the key provider of health care. This is especially true for “tourists” and those working in the hospitality industry.

The Nhommalat district center has also undergone a profound metamorphosis. The town has extended its physical boundaries south to the junction between Route 8B and 12. It has become a major stop-off point for long-distance trucks plying goods between Thailand and Vietnam as well as for international and domestic tourists. Unlike Nakai, however, there are no five-star hotels or fancy guesthouses or houseboats. Instead there are many “entertainment venues” located on the outskirts of town.
The pattern of morbidity and mortality is quite similar to Nakai. Complications or deaths from communicable diseases, such as malaria, diarrhea and respiratory illnesses have become exceedingly rare. Dengue fever, however, continues to be a sporadic problem near the district center, although deaths are not common. Although there is a large inter-district hospital, many people nevertheless choose to visit the growing number of private clinics and pharmacies. They feel more confident in the treatment, especially for non-communicable diseases which often require long-term care and follow-up.

The incidence of HIV/AIDS and STIs remains high, due to the large number of transients, especially truck drivers, businessmen, sex workers, and tourists passing through Nhommalat. Like Nakai, resistant strains of certain STIs have been detected recently, and the fact that most males still do not prefer to use condoms means that there is always a low-grade epidemic quivering below the surface.

Nhommalat district continues to encounter a large number of vehicular accidents and deaths due long-distance trucks speeding along the highways. Most injuries and deaths involve pedestrians or drivers of passing vehicles. Vehicular accidents have become the leading cause of morbidity and mortality.

6.2.2 Xebangfai Basin and Surrounding Districts:

Some of the health problems that were witnessed during the early years after the completion of the Nam Theun 2 Dam are no longer relevant. This primarily concerned poor water quality due to increased sediment from riverbanks. Within a short period of time the situation returned to normal, either due to a natural reduction in sediment or the mitigation measures implemented by the NT2 Project. This consisted of constructing new wells as sources of safe and clean potable water in affected communities. With the increased use of latrines, waterborne illnesses and intestinal parasitic infestations have practically disappeared. The use of latrines has also interrupted the lifecycle of opisthorchiasis, although older villagers still prefer eating raw or undercooked fish [laab, goi]. Malaria is no longer a problem in this region, although dengue fever continues to break out every couple of years. Some outbreaks are quite large, but deaths are exceedingly uncommon.

The district centers of Mahaxay, Xebangfai, and Nongbok, as predicted, have become important urban centers. Mahaxay still holds the distinction of being a major producer of cement, although the discovery of new quarries elsewhere may soon alter this picture. For many years dust pollution, along the road from the quarry to the factory, was a major health concern. During the dry season there was always an increased number of respiratory illnesses especially amongst villagers living close to the roadside. HIV/AIDS and STIs remain important communicable disease problems, but there are now very few deaths associated with AIDS. The leading cause of morbidity and mortality continues to be vehicular accidents. The high volume of large long-distance trucks and other vehicles plying the roads between Mahaxay, Thakhek, the East-West Corridor, and Thailand and Vietnam makes this a very dangerous junction for pedestrians and anybody else on the road.

Xebangfai has grown, but at a much slower pace than Mahaxay and Nongbok. Since it is located less than one-hour away from either Thakhek or Savannakhet, it has never developed into a major commercial or tourist stopover point. It has primarily remained an agricultural production site for domestic markets in the
nearby provincial centers. For many years local farmers substantially increased their use of pesticides and herbicides to stimulate food production. The situation only returned to normal when merchants, in the provincial towns, refused to purchase rice or vegetables grown under these conditions. In the meantime the large number of “unexplained” mortalities in farming communities suggest that pesticides may have been a contributing factor for the high number kidney and liver failures.

HIV/AIDS and STIs continues to remain an important health issue, but many of the patients are actually individuals who work along the East-West Corridor, Savannakhet SEZ, or near Mahaxay. A large percentage of young adults from many farming and fishing communities in Xebangfay district have permanently migrated to these destinations to find full-time employment. During visits home, they frequently seek care at the Xebangfay District Hospital, or at one of the small private clinics or pharmacies in the district town.

Malaria, opisthorchiasis, diarrhea, respiratory ailments, and other communicable diseases are no longer significant health problems. There are, however, regular outbreaks of dengue fever, with an occasional death occurring in a remote community. Vehicular accidents represent the leading cause of morbidity and mortality. The number of accidents, however, is much lower than that seen in Mahaxay or Nongbok. Long-distance trucks and speeding vehicles, at times under the influence of alcohol, cause most accidents.

The general health situation in Nongbok district is similar to that found in Xebangfay district. Serious illness or death, from communicable diseases, have become rare events. STIs & HIV/AIDS remain a problem, but there are a number of private clinics and pharmacies that specialize in syndromic treatment and counseling services. Vehicular accidents are probably the number one cause of death.

6.2.3 Nam Theun, Nam Kading and Nam Hinboun Basins and Surrounding Districts

This geographic area has basically not been affected by the Nam Theun 2 Project, except for tourists who decide to continue from the reservoir on up to Lak Sao, Khamkeut District (Bolikhamsay), and proceed on over the border into Vietnam. Initially there were a large number of Thai tourists from the northeastern provinces of Sakhorn Nakorn, Nakorn Phanom, and even Udon Thani, of Vietnamese descent, who crossed the Mekong River Bridge into Thakhek and subsequently traveled along this route. This was the shortest and quickest way to their ancestral villages in northern and central Vietnam. The younger generation, however, does not exhibit these same emotional attachments, and simply prefer to visit the reservoir at Nakai or other destinations in the Lao PDR and neighboring Vietnam. This cohort of tourists has at times been the cause, as well as the recipients, of some of the vehicular accidents. They have also played a role in the transmission cycle of STIs and HIV/AIDS.

6.2.4 Mekong River Basins

This geographic area has not contributed to any of the cumulative impacts on health in the NT2 Project intervention, nor has it been the direct recipients of health problems originating in Khammouane or adjacent areas.

6.2.5 Neighbouring Areas in Vietnam and Thailand

As earlier predicted the new and expanded road and bridge infrastructure connecting Thailand and Vietnam, through the Central Region of the Lao PDR has
by 2025 stimulated the economies in all three countries. The Savannakhet SEZ has attracted direct foreign investments from Thailand, Vietnam and elsewhere. It has also served as a magnet for a large pool of unemployed or under-employed rural and urban lowland and ethnic minority Lao. Tourism has boomed throughout the region, with the Lao PDR becoming an important destination for international travelers interested in eco-tourism. The establishment of a large “service industry” to accommodate tourists, investors, businessmen, and truck drivers has unfortunately also promoted the growth of “entertainment venues” which have from 2010-2025 put large numbers of adolescents and young adults, as well as other age cohorts, at high-risk for STIs and HIV/AIDS. Increased cross-border traffic has, at times, facilitated the trafficking of women and children to certain factories and “entertainment venues” where their mental and physical well-being has been put into jeopardy.

Economic development in this region has propelled the pace of urbanization, and dramatically altered the demographic composition of the rural countryside. Urbanization, migration, and rapid modernization have created new economic opportunities for many individuals, but these forces have also taken a heavy toll on others. Life is lived at a faster pace, which often brings about higher levels of anxiety, depression, and self-destructive behavior. The health picture in all three neighboring countries, in 2025, has dramatically changed from the turn of the 21st century. Non-communicable diseases have evolved as the predominant health issues. Hypertension and heart ailments, along with cancers perhaps caused by exposure to pesticides, dust, and industrial by-products, have become important causes of morbidity and mortality. These chronic health problems are much more difficult to address than communicable diseases, which are of an acute nature. Vehicular, and occupation-related, accidents have emerged as the leading cause of death and illness/disability. But these cumulative impacts on health derive from all macro and micro-economic developments permeating the country and not just the ones put into place by the NT2 Project, the East-West Corridor, the Savannakhet SEZ, the bridge and road construction, and other initiatives.

7 SUMMARY OF “BUSINESS AS USUAL” AND “BEST PRACTICE” SCENARIOS

The preceding sections are based upon a series of predictions concerning specific future development in the area that will influence the type and magnitude of NT2 impacts (added impacts). There is, however, a good possibility that many of these developments never materialize. The Savannakhet SEZ, for example, does not attract direct foreign investment, and never truly evolves into a major regional economic hub promoting cross border trade and commerce between Thailand, the Lao PDR, and Vietnam. The projected cement factory in Mahaxay opens as scheduled, but production levels remain considerably below expectations as Thai cement manufacturers decide not to reduce their exports to the Lao PDR and neighboring countries. The Nakai lake becomes a center for eco-tourism, but it does not attract large-scale investment. Hotels, guesthouses, houseboats, restaurants, and bars do not dot the shoreline. It should be noted that there are quite a number of reservoirs in northern Thailand, surrounded by pristine forests and mountains, that have not attracted any large-scale tourist oriented infrastructure projects to their shores. Some of these sites are extremely popular with both international and domestic tourists, but resorts, hotels, and guesthouses are generally located some distance from the reservoirs themselves. Although a similar situation may evolve at the Nakai lake, there should nevertheless be a marked increase in eco-tourism or simply the number of tour-
ists and travelers visiting or passing through the NT2 Project intervention area by both 2010 and 2025.

In many ways it does not matter if all, or any, of the macro and micro-economic scenarios proceed as envisioned. They represent potential developments and trends that have already been put into motion, especially those propelling an ever-expanding segment of the population to migrate elsewhere for employment opportunities. Thus if jobs are not available, to the extent projected by our ‘crystal ball’, in the East-West Corridor, the Savannakhet SEZ many youth, from both urban and rural areas in the Central Region, will nevertheless migrate to other locations such as Vientiane or Thailand. This exodus may have dramatic effects on local and national population growth rates, as young adults postpone marriage or are separated from their spouses, in home communities, for long periods of time. This can reduce fertility levels and the number of children born each year. Thus relieving potential population pressures on limited or marginal agricultural land. On the other hand migration may transfer higher population growth to urban areas, where the expansion of required social services cannot keep pace with the increasing number of people. These demographic imbalances can interfere with national plans for sustainable economic development.

The preceding sections have not focused on some of the sector developments induced by NT2 activities (induced impacts). Hydrology, for example, is one of the key inputs of the NT2 Project, but the health sector assumes that the calculations promulgated by the engineers and water management experts are reasonable. Thus projected water levels in the dry and rainy season proceed as anticipated. Minor problems focusing on reduced water quality caused by sediment and erosion will be mitigated as outlined in various project documents. Damage to vegetable gardens and fish spawning areas similarly will be addressed, and accordingly household food intake and nutrition levels are not adversely affected. Fluctuating water levels, whether in and along riverbanks, or in irrigated fields can promote ideal living and breeding conditions for rodents, certain invertebrates [e.g. snails] and insects capable of transmitting communicable diseases. But these issues should not present undue problems. Increased pesticide and herbicide use, however, is potentially a more serious health issue in the NT2 Project intervention area.

An important note before proceeding is to point out that many interventions carried out under the title “business as usual” are often the same as those prescribed under “best practices”. Some suitable examples include a measles immunization provided to a previously unvaccinated young child, or the provision of appropriate contraceptive service to a mother who presently does not wish to have another child. At times the only difference between “business as usual” and “best practices”, is the manner in which the service is provided to the target population.

7.1 The NT2 Health Action Plan

Chapter 16 (Organizational Framework and Responsibilities) of the NT2 Project Social and Development Plan (Volume 2: Resettlement Action Plan) indicates that the Resettlement Management Unit will contain a Social Services Development Unit staffed by three individuals. This will include a Health Officer, Education Officer, and Ethnic Minority Officer. One of the major roles of the Health Officer will be to manage the implementation of the NT2 Project health component. The project has designated funds for regional, project staff, and resettlers health programs. Although these plans may be substantially modified by the newly de-
signed “Health Action Plan”, below is a summary of the objectives of these three health programs.

The “regional health program” has been allocated $1,094,000 to mitigate against adverse health effects caused by the influx of an increased construction population, as well as to undertake activities to raise the health standards of the local population. The NT2 Project will coordinate its health care activities with provincial and national health programs. Efforts will focus on:

1. Provision of health education to communities concerning endemic diseases, as well as the implementation of appropriate prevention, control and treatment strategies.
2. Provision of sufficient essential drugs.
3. Training and transfer of appropriate technology to health workers and local practitioners.
4. Support for communicable disease programs.

The “project staff health program” is earmarked to receive $4,500,000 for a workforce of 4,200 construction and project personnel. This will cover the provision of health education for all staff to ensure the maintenance of a healthy workforce. The program will include an adequately staffed polyclinic at the main construction camp as well as subsidiary treatment posts at the smaller camps.

The “resettler health program” will receive $511,460 for the benefit of resettlement community inhabitants. It will provide twice-yearly examinations and special services in all resettled and adjacent communities. The program will follow national and provincial health policies and programs.

The NT2 Project has recently funded a team of external health experts, accompanied MOH officials, to draft a comprehensive “Health Action Plan” [HIA] to be included in the Social Development Plan. This exercise was completed in March 2004. Some of its key features are to up-grade the physical infrastructure at selected district hospitals, up-grade laboratory equipment and the current range of diagnostic services; procure additional medical and diagnostic equipment; and provide training opportunities for health personnel. The “Health Action Plan” is very detailed and professionally covers almost ever imaginable health situation that can potentially arise in the resettlement communities on the Nakai Plateau, at the construction and camp sites, and in other communities in the Xebangfai Basin and adjacent districts. Accordingly the HIA should ensure that “business as usual” and/or best practices” operates at an optimal level. It is not necessarily appropriate for the CIA document to comment on this plan. Instead the CIA will focus on “best practices” dealing with key health issues, that have been discussed in preceding sections. These include:

1. HIV/AIDS & STIs.
2. Vehicular and Other Accidents
3. Mental Health, Depression, Suicide
4. Pesticide Usage
5. Insect-Vector Borne Diseases
6. Water Supply, Environmental Sanitation, and Related Communicable Diseases

EcoLao
7. Other Relevant Health Issues:

7.2 “Business as Usual” and “Best Practices” Scenarios

7.2.1 HIV/AIDS & STIs

This report has intimated that although the present prevalence and incidence of HIV/AIDS in the Lao PDR, including the NT2 Project intervention area, is thought to be low, the situation may dramatically change by 2010. The MOH has recently presented its “Round 4 Proposal” to the “Global Fund to Fight AIDS, Tuberculosis, and Malaria”. The estimated budget for the AIDS component is approximately $7,700,000 over a 5-year period [i.e. 2005-2009]. The proposal plans to scale up existing efforts focusing on targeted behavior change communication for certain high-risk groups, an expanded blood safety program, social marketing of condoms, and improving the capacity of testing centers. New initiatives include the development of a referral mechanism for appropriate services as part of voluntary counseling and testing services and expanding these services into government hospitals. They also include new behavior communication change interventions and strategies for mobile/migrant workers at their site of work. The project hopes to encourage vulnerable groups to consistently use condoms, and make better use of available STI and voluntary counseling and testing services. Individuals subsequently needing specific services will be referred to facilities and organizations providing appropriate care through new referral mechanisms. The blood safety program is envisioned to protect those needing blood transfusions in 11 provinces in the Lao PDR.

One of the problems with “business as usual” is that program designers and service providers, called upon to implement the plan, frequently do not appreciate all of the dynamic and inter-related factors that can contribute to an HIV/AIDS epidemic. Most health workers in the Lao PDR, for example, have never seen an AIDS patient, in the early stages of illness, nor have they witnessed full-blown AIDS or an AIDS related death. Since they have not encountered individuals and families affected by AIDS, they still have not learned that AIDS is not necessarily restricted to selected groups of people participating in high-risk behavior. Nor do they fully understand that so-called vulnerable groups include all sexually active people as well as those soon to become sexually active. This covers an extremely large population. The degree of risk depends upon certain behavioral practices, but in reality sexually activity is a basic and natural phenomenon for all species, including human beings.

The NT2 Project, nor local government officials, can not afford to take a wait-and-see approach before deciding to implement appropriate measures to prevent and manage an HIV/AIDS & STIs situation that can easily spiral out of control. The NT2 Project should complement all efforts of the National AIDS Program, as well as spearhead additional interventions by providing adequate levels of funding for prevention, counseling, treatment, and outreach home-care services for its work force and people living in the NT2 Project intervention area. This should include, but not be restricted to the following activities:

**Regular Awareness Raising - Information Dissemination Campaigns** in all resettlement communities concerning the nature of HIV/AIDS and STIs, as well as explaining what actions can be taken to prevent and treat these illnesses. Separate venues can be established for males, females, as well as adolescents and young adults in order to facilitate inter-active discussions, questions, and op-
opportunities to express fears and concerns. Although initial efforts should include health professionals, representatives of mass organizations [e.g. LYU and LWU], and NT2 Project extension workers, a mechanism should be devised to train a network of selected villagers to serve as peer educators for their specific cohort group. These peer educators can act as first-stop “information-counseling points” before recommending further referral for more appropriate services. Similar awareness-information dissemination campaigns need to be implemented at construction camp dormitories, camp follower sites, in district centers, at secondary schools, and at places where perceived “higher-risk” groups gather [e.g. truck stops, bars, etc.]. A system of well-trained peer educators is an essential component of this initiative. Adolescents and young unmarried adults rarely feel comfortable discussing sexuality with government health workers who may not approve of their behavior.

**De-stigmatizing Campaigns** in all resettlement villages, in district towns, schools, construction camps, places where perceived “higher-risk” groups congregate, and other appropriate venues. One of the tragedies of HIV/AIDS in the era when there was no treatment, but which still continues today, concerns the fact that AIDS patients and their family members have been unnecessarily, and at times cruelly, ostracized and abandoned by their communities. This should not be allowed to continue since HIV/AIDS, and STIs, are merely communicable diseases, which do not put the general population, community members, or people in one’s family at risk unless there is a certain level of specific intimacy involved. De-stigmatizing HIV/AIDS so that it is seen as one of many illnesses that can be transmitted to others under certain circumstances, will encourage people to seek information, counseling, and care, in an appropriate and timely manner. This development, by itself, can dramatically reduce the risk of further transmission. In order for such a strategy to succeed, one has to enlist the support of influential people. Although this may include government officials, it also has to include well-respected natural leaders such as monks, village headmen, traditional practitioners, and others who people turn to in times of trouble. De-stigmatizing messages can be inserted as part of regular sermons at Buddhist temples or other religious ceremonies, or at village gatherings. Before a potential HIV/AIDS, and/or STI, epidemic emerges people need to understand that they should not be afraid of this illness. If proper precautions are taken, nobody else need be infected. And if infection develops, there are ways to prevent further transmission, as well as to treat some or all of the signs and symptoms associated with the illness.

**Designing Effective HIV/AIDS [& STI] Counseling, Treatment, and Outreach Care Strategies**

At the present time there are not any blood testing, counseling, or treatment services for HIV/AIDS at district hospitals. One cannot develop an effective prevention and control program unless it contains these essential components. To do so trainees have to be selected carefully, and sent to sites and/or facilities where they can obtain hands-on competency based skills, as well as theoretical information to expand their understanding of this illness. Since there are very few sites in the Lao PDR that handle large HIV/AIDS patient loads, or implement village-level outreach care services, the NT2 Project should consider other alternative options. In consultation with local authorities and the National Committee for the Control of AIDS, it may wish to explore providing support for short-term study tours, of varying length, to observe dynamic and effective HIV/AIDS counseling, treatment, and outreach care initiatives at appropriate health facilities in Thailand.
The Sanpathong district hospital in Chiang mai/Thailand, is a facility that manages the clinical treatment of hundreds of HIV/AIDS patients. Its out-patient and in-patient wards continually have a flow of AIDS patients suffering from a wide range of opportunistic infections who are clinically managed according to symptoms and/or with HAART [highly active anti-retroviral therapy]. It offers a full range of diagnostic tests, including HIV serological confirmation as well as CD4 and viral-load counts to better manage treatment schedules. The facility has an “user friendly” counseling service for anybody interested in learning about HIV/AIDS or for patients and family members suffering from this illness. It also operates an outreach home-care program in close coordination with sub-district level health centers and NGOs. It is an ideal setting for health professionals, mass organization representatives, and peer educators to learn how to establish and operate a comprehensive HIV/AIDS prevention, counseling, and clinical treatment and management program. The district hospital has also been instrumental in designing community based initiatives that have de-stigmatized HIV/AIDS.

The PATH Foundation Philippines, Inc., a local NGO, has worked with the MOH and the private sector to created the largest STI syndromic treatment and management program in the country. It has trained, and continues to re-train, a network of hundreds of private pharmacies in urban and rural areas that provide information, counseling, and syndromic treatment to STI patients and contacts. Similar study-tours can be arranged to observe how this initiative was established, as well as to learn how it has been able to remain entirely self-sustainable.

Establishing “User Friendly HIV/AIDS & STI Counseling and Treatment Facilities:

In addition to properly training health staff and others, to provide high quality counseling and treatment services, facilities need to be located in appropriate settings. Many people, especially adolescents, unmarried adults, and others [e.g. truck drivers, construction workers, females engaged in the “entertainment sector”], often avoid visiting government hospitals. It is either inconvenient or too public a venue to be seen seeking these types of services. As such other more “user friendly” sites need to be identified and supported to provide HIV/AIDS & STI counseling and treatment services. These facilities can also serve as convenient outlets for condoms, as well as other contraceptives [e.g. oral pills and emergency contraceptive pill-packets] to prevent unwanted pregnancies and reduce the risk of abortions, in rural or urban areas. The LYU and LWU should be invited to play an important role in the design and operation of this project component. The counselors should be drawn from target cohort population(s) as well as include professional clinicians. This can include people from both the public and private sector. The construction camps are an ideal setting for some of these “user friendly” facilities, but other venues need to be incorporated into the scheme. It can include Youth Clubs in schools, during the evening, or for similar clubs established at rural health facilities in the resettlement village area. It should include places where young people congregate to relax and meet on a social basis. The number and type of sites and settings can vary according to locale. Peer educators and professional health workers can receive certain incentive payments for their participation. A key function of these “user friendly” counseling and treatment centers, should be to serve as focal points to help adolescents and young adults acquire basic “life skills” to more successfully deal with new circumstances and situations that can easily emerge in a rapidly changing socio-economic environment. This can include teaching young women not only...
about the risk of HIV/AIDS and STIs, but also how to negotiate “safe sexual practices”, such as convincing permanent and casual partners to consistently use condoms. “Life skills” also include instructing young adults how to balance a weekly or monthly budget to ensure that they do not easily go into debt, and come under undo stress and worry that can lead to alcohol and drug abuse, or other self-destructive behavior.

**Establishing Outreach Home-Care for People and Families Living With AIDS**

Many HIV/AIDS patients, and their families, will not be able to visit government health facilities or “user friendly” counseling and treatment sites, for a variety of reasons. Some of these people may feel embarrassed and not wish others to know of their HIV/AIDS status. Others will simply be too ill to travel outside their home, or unaware of where to go for appropriate care. The NT2 Project should try to establish a “confidential data-base” of HIV/AIDS affected families to help provide social and medical services to its work force as well as to others living in the NT2 Project intervention area. If the disease is de-stigmatized before it turns into a major epidemic, there will be a greater chance that it will be looked upon as simply another communicable illness and affected people and families will not have to conceal their identity. Home health care visits, as part of routine outreach mobile clinics, to resettlement villages, communities in the NBCA, or in and around the district centers, will not attract undue attention. They will make it possible for AIDS patients to receive proper care as well as to monitor medication schedules for serious long-term opportunistic infections [e.g. Tuberculosis] than can possibly be transmitted to other family members.

7.2.2 **Vehicular and Other Accidents**

The frequency and severity of accidents will greatly increase during the “construction and community resettlement phase” of the NT2 Project. This report has predicted that within a relatively short period of time, accidents may become the leading cause of morbidity and mortality in the Lao PDR. This development should not come as any surprise because this phenomenon is being witnessed throughout much of the world, especially in southeast Asia. Although there are many types of accidents, vehicular accidents will become the most serious cause of injury, disability, and death. One relevant question is whether vehicular accidents can be prevented in developing countries? In urban, as well as many rural settings, the large-scale use of motorized vehicles seems to have materialized, as if by magic, almost instantaneously. People who have never sat as passengers are now plying along the thoroughfares, in various acrobatic positions and at velocities usually associated with home-made rockets. There does not seem to be any formal driver’s education requirements necessary to obtain a driver’s license, and traffic rules and regulations are frequently not enforced by local authorities. In such an environment, the following scenario is hoped to be a reasonable approach that can go beyond “business as usual” and evolve into “best practices” strategies. It can include, but not be limited to, the following components:

**Establishing a District Road Safety Awareness Plan**

The NT2 Project should work closely with local government authorities, mass organizations, and village and traditional leaders to increase awareness about the dangers of vehicular accidents, to ensure that this issue is given a much higher profile and priority than currently exists. These leaders need to be informed, and appreciate the fact, that vehicular accidents may soon kill, disable, and injure
more people in their communities than all communicable diseases combined. District authorities need to design and implement practical strategies that can impact on the issue. Passing rules and regulations that are not enforced, or allowing anybody regardless of age, or a formal demonstration that they can operate a vehicle responsibly, to be driving on the roads will simply perpetuate the current situation. The plan should, like the one suggested for HIV/AIDS awareness, be taken to the village-level as well as brought into schools, temples, work sites, and other venues where young people congregate. It should avoid unnecessary rhetoric and provide opportunities for drivers to gain an understanding of road safety as well as acquire safe driving habits and skills.

**Establishing A Road Safety Enforcement Unit**

All individuals, whether police or other government officials, responsible for road safety enforcement should be enrolled in special courses to review existing traffic rules and regulations. They should be given explicit instructions on how to enforce rules and regulations when encountering major categories of infractions (e.g. speeding, driving under the influence of alcohol, driving without a license, driving with an expired license, being under the legal to operate a vehicle, etc.). Village leaders should also be enrolled in a modified road safety enforcement program. This would allow them to warn or fine villagers who are a hazard to the safety of their community while driving; whether it is for speeding, driving while under the influence of alcohol, or allowing children below the legal driving age to operate a motorized vehicle. Fines should not be high or arbitrary. Communities should also verbally indicate beforehand whether or not that they wish to participate in such a road safety scheme before enrolling village leaders into the program.

**Constructing Traffic Lights in District Towns and at all Major Intersections**

One of the main reasons that vehicles travel at high speeds, through populated as well as unpopulated zones, is that there are very few traffic lights on roads or at major intersections. As such there is no need for drivers to adjust their speed limit, even when passing through populated areas or at major intersections where there may be on-coming traffic. Traffic lights are more effective than traffic signs. Although many district centers are quite small, there should be a national or local [as in the case of the NT2 Project] policy to construct at least three traffic lights at these sites. This can consist of one traffic light at either end of the town, before entering and leaving the district center. Another traffic light can be erected in the middle of town or at any major intersection in the district center. This policy will force all vehicles, but especially long-distance trucks traveling at high speeds, to slow down and/or stop before passing through the district center. Similarly traffic lights should be constructed at all major junctions and intersections, in the rural countryside, to avoid serious head-on collisions. In many parts of the country one can travel for more than one hundred kilometers, at a stretch, without encountering a traffic light. Functional traffic lights unconsciously teach drivers to reduce speed while passing through populated areas that may have pedestrians or bicycles on the road. Prompt law enforcement, and the payment of stiff fines, for infractions, may gradually encourage people to drive more carefully.

**Establishing Formal Drivers Education Courses in all Districts**

In many countries drivers’ education is a required part of the national or provincial educational curriculum. Some programs simply focus on traffic rules and regulations, in preparing interested students to take a formal written examination and a
practical driver’s demonstration test. Special “driving schools” instruct students to properly operate a vehicle. Other programs focus on both components; teaching students the basic “rules of the road” as well as how to operate a vehicle to prepare for formal examinations. The NT2 Project should support formal drivers’ education courses at the construction sites, for project and government personnel in the district town, as well as for villagers in the resettlement communities and for students attending the secondary school in the district town. Course material should make use of videos, as well as more inter-active methodologies such as “role playing” and “case studies” to illustrate important points as well as make “potential drivers” understand that their behavior on the road can have serious consequences for themselves and others. Once again it would be a good idea to enroll the support of monks and other religious leaders to emphasize the ethical responsibilities of operating a vehicle, since it may lead to the death or disability of an innocent bystander.

Establishing a Financial Incentive Policy to Encourage Safe Driving Habits for NT2 Project Personnel

The NT2 Project should consider establishing a formal policy that offers financial incentives for its drivers, construction workers, and other employees who have a safe driving performance record. This issue may be more relevant to project personnel employed as drivers, but it can include construction workers and other staff as well. The rationale is that NT2 Project employees should receive annual bonuses for safe driving records, as well as fines or dismissals [i.e. in the case of those hired as drivers] for minor and/or serious traffic violations and infractions. Financial incentives, and disincentives, are a very effective means of encouraging project employees to drive carefully and avoid unnecessary risks. Project employees, especially those hired as drivers, need to know that they will be personally held accountable for hazardous driving that endangers the life of others. Safe driving can include the consistent use of safety belts, helmets, having rear-and-side-view mirrors on motorcycles and larger vehicles, etc.

Establishing Village-Level First Aid and Emergency Care for Accident Victims

In addition to vehicular accidents, villagers may also face an increasing array of other types of injuries that could result in disability and death. For those living downstream along the Xebangfai Basin, rising water levels created by the release of water from the reservoir, power station, and regulating and holding ponds can potentially increase the number of drowning accidents. Village level awareness campaigns need to be introduced by the project or by other relevant government agencies and mass organizations. The LWU, and village-schools, are an ideal mechanism to instruct mothers and young children about the need to follow safety precautions while bathing, playing, collecting water, or washing clothes in and alongside the river. Occupational accidents in the fields and injuries around the house should be similarly addressed by a NT2 Project sponsored accident awareness and “first aid and emergency care” training program for health dispensary workers and VHVs. At the present time “first aid and emergency care” is not a basic component of pre-service and in-service training courses for village level health workers and volunteers. The potential increase in drowning related accidents, especially amongst young children and women, living in riparian communities should be a high priority for the NT2 project. Medical staff, at the project polyclinic at the main campsite, can assist district hospital personnel design an appropriate in-service curriculum that enables village health workers and volunteers to obtain specific competency-
based skills. This should include artificial resuscitation for drowning victims, as well as the cleaning, suturing, and dressing of minor wounds sustained at home or at work. The course should also teach health workers and volunteers how to prepare injury victims who need to be referred and transported to a district or provincial hospital, so that the journey does not exacerbate their condition or lead to permanent disabilities. Village level health workers and volunteers should also be trained to provide emergency care for pesticide poisoning accidents as well as for eye trauma caused by pesticide inflammation.

**Up-grading District Hospital to Treat Accident Victims**

The “Health Action Plan” indicates that the project will train health staff at the Nakai and Nhommalat district hospitals to treat and stabilize major injuries and illnesses [basic orthopedic services, eye trauma services, road and construction accidents]. This sounds fine on paper, but it may not take into consideration the educational and medical background and experience of existing health personnel. As mentioned earlier, in this report, each of these two facilities presently have only one physician. They, and other staff, have never been trained to perform any surgical procedures. Assuming that the NT2 Project could organize this and other technical training programs, what assurances are there that these individuals would remain in remote districts if there were vacancies at the provincial health hospital or health office.

A “best practice” strategy may be for the NT2 Project to establish a special postgraduate or in-service training “scholarship fund” to attract clinicians, surgeons, obstetricians, laboratory technicians, vector-borne disease and public health specialists to commit themselves to at least 5 years of public service in Nakai and/or Nhommalat districts. Depending upon the specialty, training could consist of ongoing post-graduate, or special courses, offered at Mahosot, Friendship, and Sethathirat Hospitals in Vientiane. The course of study could also include degree and/or short-term study programs at internationally recognized institutes from countries in the Asia region. Fieldwork could take place in the NT2 Project intervention area. This proposal should attract more health professionals to remote geographic areas, as well as establish a core group of specialists who could subsequently, over a period of time, conduct continual in-service training for coworkers at district and village level health facilities.

More specifically the NT2 Project may wish to adopt a similar approach that was undertaken by the Consortium in the Lao PDR, an international NGO, which has assisted the MOH implement the “War Victims Assistance Project” (WVAP). The WVAP has dramatically improved the capacity of provincial and district hospitals in Xieng Khouang, and Houa Phan, to provide emergency, medical, and surgical care to UXO [Unexploded Ordnance] accident victims. Working closely with surgeons and nurses, at the Friendship and Mahasot Hospitals in Vientiane, a full range of clinical and surgical training courses have been designed and implemented for selected staff at the provincial hospital level, as well as for all professional staff deployed to the district hospital level. The training program is based upon a team-teaching and on-site visit supervisory approach, which cascades down from the national to provincial to district level. The WVAP, in a relatively short period of time, has dramatically improved the capacity of urban and rural health facilities to deal with life-threatening emergencies. Professional staff have been trained to work as a team at Intensive Care Units, Emergency Rooms, and Operating Theaters. They can deal with most trauma issues, and perform selected orthopedic surgical procedures. Although the WVAP is designed to address the needs of UXO victims, the major beneficiaries are in fact the large...
number of people injured in vehicular accidents, as well as other patients needing modest-mid level surgery.

7.2.3 Mental Health, Depression, Suicide

The NT2 Project will put into motion certain forces that may directly impact upon the mental health of people living in the project intervention area. At a minimum the NT2 Project will relocate selected ethnic minority communities presently living on the proposed reservoir site. Although this resettlement process will, for most communities, consist of a physical move of < 5 kms from their current homes, it may set off a chain-reaction that upsets the normal course of daily life for many families and communities as a whole. The “Ethnic Minority Development Plan” and “Resettlement Action Plan” outline specific measures to take to minimize possible adverse effects of this relocation, as well as ensure that the lives of the affected population are improved. This report, however, has indicated that within the 5-year construction and resettlement phase, other related developments on the Nakai Plateau or in adjacent geographic areas, may cause an entirely new realm of disruptions to communal life, or cause problems within families.

The large influx of construction workers and other migrants, to the district center, will undoubtedly promote changes in daily lifestyle and ways of thinking. Resettlement communities may soon turn away from subsistence farming and be drawn into the market economy. This can include the production of food and other products for sale in the district markets, or by serving as a source of labor for various businesses and venues providing goods and services to construction workers and others in the district. The latter category will probably include adolescents and young adults, who as indicated elsewhere in this report, may decide to travel further away from their homes in search of employment. While this development may promote the inclusion and integration of remote ethnic minority communities into the socio-economic fabric of Lao national society, it can also result in internal conflicts between family members, especially those of different generations. Large-scale migration, both into and out from, Nakai and to a lesser extent other neighboring districts, will erode traditional values and practices, as well as perhaps lead to the disappearance or daily usage of ethnic minority languages within the span of one generation.

The potential effect of an HIV/AIDS epidemic in ethnic minority communities will be devastating for family members who have to care for patients, as well as take care of orphans and/or replace the household’s primary source of income. Constant daily anxieties may develop, in certain households, as migrating family members fail to send home any news of their living/working conditions, or anticipated remittances to support the family unit. For those migrating away from homes, a certain percentage will undoubtedly find themselves in situations where they are physically or mentally abused, or where they feel isolated and disoriented in an alien and perhaps hostile environment. All of the above scenarios will probably lead to an increase in the prevalence and incidence of mental illness. This can include depression, alcohol and substance abuse, violence, and perhaps suicide.

Dealing with the increased amounts of daily stress, associated with modernization, is not a simple task whether one lives in a developed or developing country. It is considerably easier to treat acute illnesses, than chronic conditions for which there may not be a specific cure or ameliorative therapy. A major constraint in the Lao PDR is that the health care delivery system is currently inadequately prepared to deal with mental health issues and problems. Hospitals are not
staffed with psychologists, social workers, counselors, or others trained to handle actual or potential emotional problems. A similar situation exists among other government line agencies and mass organizations. Accordingly some of the proposed “best practices” strategies may in fact be impractical to implement.

**Establishing Public Awareness Raising Campaigns Concerning Mental Health**

Local authorities, members of mass organizations, and community members need to be re-oriented to understand that an entirely new set of circumstances will shortly be underway, as remote districts in Khammouane are gradually brought into national economic development schemes. These groups need to understand and appreciate that mental health problems, just as was the case with vehicular accidents, will become a major cause of illness and perhaps even death in the near future. Members of the LWU and LYU, as well as teachers and community leaders, need to take a major role in being trained and prepared to handle some of these issues. Special courses on mental health preparedness and problem resolution interventions should be conducted on a regular basis.

**Establishing Job Placement Agencies to Monitor Domestic and Overseas Migration as well as to Prevent the Trafficking of Women and Children**

The NT2 Project should work closely with local authorities, mass organizations, and businesses to establish a local job placement agency. This agency would assist ethnic minority community members, and others, to find suitable employment in Nakai, Nhommalat, and neighboring districts. The agency could ensure that workers are paid as agreed upon in their contract, and that working and living conditions are adequate. The agency would try to keep tract of local people who have migrated to other geographic areas of the country [e.g. the East-West Corridor] or to neighboring countries to ensure that women and children are not lured under false pretenses to become part of trafficking networks. This will not be an easy task, but if potential employers see that local government authorities are concerned about their citizens and are willing to keep tract of their whereabouts, it may deter unscrupulous agents from entering the NT2 Project intervention area.

**Establishing Emergency Mental Health Hotline Clubs**

In many urban areas, “emergency mental health hotlines” have been established. These networks employ professional counselors and operate on a 24-hour a day basis to assist “callers” with problems or difficult situations, or to talk with people who may even be contemplating suicide. Although this strategy may be impractical for the Nakai Plateau and other areas of the NT2 Project intervention area, “emergency mental health hotline clubs” for youth, parents, and other at-risk cohort groups can be established in ethnic minority villages, the district center, or at other appropriate venues. A key component of this strategy is to train local people [e.g. teachers, monks, traditional practitioners, members of the LWU/LYU, adolescents/young adults, construction workers, “bar girls”, etc.] to become effective “first-point” counselors for their peers or a larger population. Many people, experiencing an emotional issue, simply require an opportunity to discuss their problem, before feeling better. Others will need professional medical/psychological assistance. If local authorities do not have the proper experience to establish such clubs, or conduct appropriate training, the NT2 Project may wish to invite an experienced NGO, or individual, to help with this assignment on a part-time or full-time basis.
**Promoting the Preservation of Tradition Values and Customs**

Those who promote the benefits of globalization frequently suggest that these socio-economic changes offer new and unlimited challenges and opportunities for present and future generations. They sometimes ignore the fact that our “global village” may in fact contain less diversity and fewer viable life-styles today than it did 20-50 years ago. The NT2 Project should assist local communities to preserve their traditions through a variety of mechanisms. This can include the promotion of tradition festivals, or the modification of curriculum in local schools which encourages traditional practitioners, religious leaders, farmers, and housewives to enter the classrooms as guest speakers. This approach will help students understand the rich cultural heritage that their parents and ancestors have preserved up until now, and have helped pass down from generation to generation. Some of these “special lectures or demonstrations” can be included as part of the regular coursework on history, biology, health, language arts, etc. Some of these topics can perhaps also be introduced as part of special mini-courses held during annual school vacation periods. In addition to enriching the educational experiences of students, this strategy can help the younger generation appreciate their various diverse cultural backgrounds. It can help students understand that in life one can have separate identities or facets to their personality, and that it is not necessary to be limited a single option.

**Pesticide Usage**

Although the agricultural extension component of the project will emphasize “Integrated Pest Management” and the avoidance of chemical pesticides and herbicides, unforeseen circumstances may eventually encourage farmers to abandon this approach. Irrigation, during the dry season, will promote the cultivation of a second rice crop and/or additional cash crops; and local, national, or regional market forces may promote the use of pesticides and herbicides to increase yields, exports, and incomes. The use of chemical pesticides and herbicides will endanger the health, and perhaps the lives of many people. Pesticides can be absorbed by the skin, inhaled through the lungs, and consumed through water and food contaminated by these products. Chemical pesticides and herbicides can also enter waterways, from the rice-fields, and gradually endanger the entire ecological system. Not all scientists and physicians agree on the level of pesticide exposure needed before an individual becomes acutely or chronically ill. However chemical pesticide and herbicide usage has been indirectly implicated as a major causative factor in the growing number of cancers, and liver and kidney problems, in rural farming communities throughout southeast Asia. The storage of toxic pesticides and herbicides, in and around homes in rural communities, may also lead to unintentional poisoning accidents or attempted suicides. This has been the experience in neighboring countries.

The NT2 Project should assist local authorities to take pre-emptive measures to ensure that this problem can be avoided, or minimized to the extent possible. Some of the “best practices” strategies could include the following:

**Promoting Pesticide/Herbicide Awareness Campaigns**

Many farmers in the NT2 project intervention, especially on the Nakai Plateau, have limited experience with the use of chemical pesticides and herbicides. It is important that they, as well as local authorities, understand both the short-term and long-term implications of extensive chemical pesticide use, on the environment, and on the health of communities, households, and individuals. Local
merchants, restaurant owners, and others buying agricultural products from farmers similarly need to be appraised of the dangers associated with chemical pesticide usage. Local authorities should encourage all potential consumers and traders to only purchase agricultural products that have not used chemicals pesticides. If consumers understand the importance of following such a policy, it will act as an incentive for farmers to follow integrated pest management approaches.

**Instructing Farmers and Others How to Properly Use and Store Chemical Pesticides and Related Equipment**

Although the goal should be for the establishment of a “chemical pesticide free zone”, this may not be practical under all circumstances. There may be times, and conditions, under which chemical pesticides need to be used. As such the NT2 Project should assist local authorities prepare IEC and other training materials to demonstrate how to properly prepare, use, and store chemical pesticides and herbicides. This can be accomplished through the use of videos, role-playing demonstrations, or other appropriate methodologies. Agricultural extension agents, the LWU, and other government agencies need to participate in this initiative for success. Farmers need to know what type of protective clothing they should wear when preparing and using pesticides. They also need to know how to properly clean utensils and containers used to apply pesticides; and what measures to ensure that these items do not contaminate the environment. Both farmers and mothers need to know how to store pesticides so that they are out of the reach of young children and do not pose any danger to household members. It would also be useful for local schools to include topics concerning the dangers of chemical pesticide usage, and safety measures to take for the prevention of pesticide poisoning accidents as part of biology and health lessons.

**Establishing Emergency Treatment Programs for Pesticide Poisoning Accidents**

The NT2 Project should support training courses for health personnel at district hospitals and health dispensaries, as well as for village health volunteers, to provide prompt emergency first aid care for accidental or intentional [e.g. attempted suicides] pesticide related accidents. Although ingestion will be the most common medium of pesticide accidents, first aid courses need to cover emergency eye and skin trauma care resulting from exposure to chemical pesticides. In rural areas of Thailand, pesticide-attempted suicide are quite common, especially among adolescents and young adults who cannot deal with minor disappointments in life and who do not realize the seriousness of their actions. This development has already been anecdotally mentioned as a cause of increasing suicides in Nongbok district.

7.2.4 **Insect-Vector Borne Diseases**

Malaria and dengue fever will continue to be significant health problems requiring specific attention in the NT2 Project intervention area during the construction and resettlement phase. The “Health Action Plan” outlines a number of measures to support national, provincial, and district initiatives to control these two important insect-vector borne diseases. Although the prevalence and incidence of malaria has dramatically declined in Khammouane, as well as throughout the Lao PDR, sustained long-term interventions are required for the foreseen future. As mentioned earlier, the MOH has just presented its “Round 4 Proposal” to the “Global
Fund to Fight AIDS, Tuberculosis, and Malaria”. The estimated budget for the Malaria component is approximately $14,500,000 over a 5-year period [i.e. 2005-2009]. The key service delivery areas under the National Malaria Control Programme are vector control with the use of insecticide-treated bed nets, rapid diagnosis and treatment of falciparum malaria cases, and the provision of subsidized bed nets and anti-malarial drugs to poor and vulnerable populations in hard-to-reach areas.

The MOH expects to cover 100% of the 3.6 million people currently living in endemic malaria areas, throughout the country, through the use of either treatable nets and/or long-lasting nets [LLN]. Treatment with artemisinin-based combination therapy (ACT) will be instituted to address the increased resistance to chloroquine and sulfadoxine-pyrimethamine. The MOH hopes to reduce the malaria morbidity rate from 6.6 to 1.3/1,000 population, and malaria deaths from 187 to 37 by the year 2009. New drug treatment policies and the use of LLN are expected to reduce the workload and expenses incurred during annual campaigns and re-treatment of bed nets. These measures should hopefully resolve most of the logistical, technical, and operational problems encountered in the first phase of the Global Fund Grant.

Dengue fever [and DHF] may potentially become a more serious health problem in the NT2 Project intervention area. In 2002-2003 several districts in the lower Xebangfai Basin [e.g. Nongbok and Xebangfai districts] experienced explosive outbreaks of dengue fever. There are some major differences between dengue and malaria. Dengue is more prevalent in urban than rural communities, but it can rapidly spread to peri-urban and rural areas as well, often with a high mortality. Unlike malaria there is no specific chemotherapy for dengue, and clinicians must rely on supportive care and proper management of intravenous fluids to prevent the patient from going into shock. Aedes aegypti and other related species of the genus are the vectors associated with the transmission of dengue fever. These mosquitoes breed in small collections of water, frequently in and around houses. They tend to be active during the daytime, and hence sleeping under insecticide treated bed nets does not offer any protection. At the community level early diagnosis, rapid referral to the next level, and informing local authorities of an impending outbreak are important actions to be taken. At the district hospital level case management of DHF is the most important intervention, but it may be necessary to rapidly evacuate the patient to a provincial or regional hospital. In many ways dengue is more difficult to control as the mosquito vectors live in close proximity to susceptible human hosts. In the case of malaria, mosquito-breeding sites may be situated many kilometers from the home of susceptible human hosts.

With the influx of more than 4,000 construction workers and perhaps several thousand additional migrants, to the NT2 Project intervention, there will be an increase in optimal breeding conditions for Aedes aegypti mosquitoes. Areas where people congregate during the day such as work sites, living quarters, schools, markets, and hospitals should be targeted for control activities. Increased spontaneous settlements, with inadequate water supply (and the need for domestic water containers) and the increased use of rain-filled tires and other containers will lead to increased Aedes aegypti populations. Crowded living conditions and increased population movements will exacerbate transmission. These same cohorts may also serve as a focal point for new malaria outbreaks unless they are included in prevention, control, and treatment strategies of the National Malaria Control Programme.
Some “best practices” strategies can include the following:

**IEC Information and Awareness Raising Campaigns**

Local government officials, mass organizations, rural communities, new migrants, and people living in the district center need to understand that malaria has not been eradicated, and that the measures used to control and treat malaria have no effect on the transmission of dengue fever.

**Establishing Weekly “Community Mobilization Clean-Up Campaign” Activities**

It is important to mobilize the various at-risk populations to understand the importance of emptying any containers [e.g. water jugs, flower pots, discarded tires, etc.] lying in and around the house which can serve as breeding sites for *Aedes aegypti* mosquitoes. These containers must be emptied and scrubbed [both on top and bottom sides] to remove mosquito eggs. Essential water containers, such as domestic water storage jars, and other containers that cannot be easily removed from the environment, should be treated with appropriate insecticides. It is best to organize a team consisting of health professionals, members of mass organizations, housewives, workers, students, etc. who can systematically go around the village, district town, camp sites, work areas, etc. to ensure that all potential breeding sites have been emptied and/or treated with insecticides. This activity has to continue throughout the entire breeding/transmission season. In many communities, the mobilization clean-up campaign takes place on every Saturday.

**Conducting Emergency Spraying Operations**

In the event of a dengue fever epidemic, it may be necessary to conduct emergency spraying operations. The NT2 Project may wish to support these activities if resources from the provincial health office are inadequate for the purpose. This may include the purchase of a thermal fogger, insecticides, and operating costs for the machine.

**Supporting DHF Clinical Management Training Courses**

The high case fatality rates associated for dengue hemorrhagic fever illustrate that hospital and health center staff need to recognize potential serious signs and symptoms, as well as be able to make clinical management decisions that can save lives. Many seriously ill patients will need to be immediately referred to the provincial hospital, but since that may not be practical, at all times, front-line clinical staff need to be better trained to take emergency and life-saving measures. The NT2 Project should provide funds for appropriate DHF clinical management training opportunities for district hospital and health dispensary personnel.

**Supporting the Procurement and Re-Impregnation of Insecticide Treated Bed Nets for Selected Target Populations in the NT2 Project Intervention Area**

It may not be practical for the NT2 Project to provide funding to purchase insecticide treated bed nets for everybody in the NT2 Project intervention area. The project should, however, consider this procurement for all construction workers [if their dormitory sites do not have adequate screening on windows and doors], re-
settlement communities, and for indigent families in the NT2 Project intervention area. There can be several modalities involved, such as subsidizing the entire purchase cost or establishing a fund which recipients eventually repay over a specified time period. The bed nets should be of LLN variety, which can last if properly maintained for 5-6 years. LLNs are impregnated with insecticide during the production process, and accordingly do not have to be re-impregnated for another 5-6 years. For households, which already have IBNs, the NT2 Project should support annual re-impregnation activities. Those nets that are no longer in a usable condition, should be replaced with LLNs, so that eventually all bed nets are of the LLN variety. The NT2 Project may similarly wish to establish a “supplementary IBN fund” for households who need additional IBNs for certain family members sleep in temporary huts adjacent to their rice-fields when they are involved in planting, weeding, and harvesting activities. This will ensure that all members of the household are protected against malaria no matter where they are sleeping. This intervention should be discussed and coordinated with district, provincial, and national Malaria Control Programme personnel.

**Supporting the Procurement of Artemisinin-based Combined Therapy (ACT) for Falciparum Malaria Patients**

With the increased resistance to chloroquine and sulfadoxine-pyrimethamine, the NT2 Project should consider procuring adequate supplies of ACT for the treatment of falciparum malaria cases. This intervention should be discussed and coordinated with district, provincial, and national Malaria Control Programme personnel.

**Supporting the Procurement of Rapid Diagnostic Tests for Falciparum Malaria Patients**

A key strategy that has led to a dramatic reduction in malaria, has been early diagnosis and adequate treatment (EDAT) of confirmed, or suspected, cases. The project should provide financial support for the training of district hospital staff/laboratory technicians and village-level health/malaria workers, at dispensaries and in at-risk communities, to properly use rapid diagnostic test kits [dipsticks] to confirm falciparum malaria and accordingly immediately commence appropriate treatment. This intervention should be discussed and coordinated with district, provincial, and national Malaria Control Programme personnel.

There are other potential insect and animal-borne diseases, such as scrub and murine typhus, leptospirosis, and filariasis, but they are currently not endemic to the Lao PDR, or not serious public health issues. Construction workers may be at a higher risk of contracting scrub typhus, than the general population, but IEC campaigns at the work site, and prompt treatment of suspected cases are the most cost-effective ways of controlling/managing this issue.

**Water Supply, Environmental Sanitation, and Related Communicable Diseases:**

The overwhelming majority of people living in the various zones of the NT2 Project intervention area use potable water for drinking and other household purposes that derives from unsafe, or potentially unsafe, sources. Although principal water sources vary amongst zones and between communities, most people use ponds, rivers, streams, unprotected shallow dug wells, and rainwater. The quality of these water sources can considerably fluctuate during the year; with various contaminants and external matter entering water sources during the rainy season. In the dry season there is a danger that the concentration of potentially
harmful pathogens or contaminants increases, so as to make potable water less safe for consumption. The percentage of households with latrines remains very low throughout this geographical area. Most latrines are pit latrines. Very few are of the “hand” flush-toilet or water-seal variety, which are more effective to use as there is less chance for human wastes to contaminate the immediate environment. In addition to the lack of latrines, general environmental sanitation conditions in and around the house are often conducive for the spread of a wide range of water and soil-borne pathogens. Hence it is not surprising that most villagers, regardless of age, have intestinal parasitic infestations [e.g. roundworm, hookworm, pinworm, etc.], and are susceptible to frequent bouts of diarrhea.

Opisthorchiasis, a trematode disease, caused by a liver fluke is exceedingly common in all parts of the NT2 Project intervention area, except for the Nakai Plateau. Although most infections are mild, the pathogen colonizes and obstructs the bile duct, causing jaundice and possibly leading to cirrhosis, enlargement and tenderness of the liver, as well as progressive liver damage. Eating raw or undercooked fish and crayfish is the means of transmission. The adult worm subsequently deposits eggs in the bile duct, which is then evacuated in feces. If the feces enters a water source, the parasite will initially invade an appropriate intermediate snail host and develop into a larva. The larva leave the snail and invade a second intermediate host (certain species of fish and crayfish), where they enter the muscle and encyst. The cycle is complete when another person eats the infected fish raw or undercooked (e.g. in laab or goi). Opisthorchiasis is probably the most prevalent parasitic infestation in the NT2 Project intervention area. Although there are many campaigns to convince people to change their “eating habits”, the only practical means to alter this situation is to expand latrine use to all households and to provide chemotherapy to infected individuals [i.e. the drug praziquantel].

The NT2 project has conducted several intensive studies to determine whether schistosomiasis could potentially be introduced into the NT2 Project intervention area. The opinion of leading entomologists and communicable disease experts is that although the snail vectors are present in the NT2 Project intervention area, it is extremely unlikely that this serious illness can be established outside of its only known foci in the Lao PDR (i.e. Khong District in Champassack). Although the snail vector thrives in many locations in the Mekong River, and on some tributaries it has never established itself in human populations outside of Khong District. Construction and use of latrines, and treatment with praziquantel, are the best ways to prevent as well as treat and eradicate the disease.

As previously mentioned in this report, the quality of potable water may potentially decrease during the early period after the COD, as water-volume downstream from the power station, regulating and holding ponds, and downstream channels increase and erode riverbanks. This will increase the amount of sediment in the river, as well as adversely affect natural springs and wells alongside the riverbank. The NT2 Project Social Development Plan outlines a variety of mitigation strategies to deal with such eventualities. The “Health Action Plan” includes an elaborate list of recommendations to improve water supply and environmental sanitation. This includes the implementation of a Khammouane provincial rural water supply and sanitation improvement project. This initiative would provide safe drinking water supplies to many communities at a fixed-rate of piped water, public tabs, tube-wells, or protected wells per village. It would also determine an adequate supply of latrines per village. The action plan contains recommendations for the provision of safe drinking water supplies, and latrines, to individual households in the resettlement villages, as well as for camp-sites.
and potential camp follower settlements. It is a very comprehensive plan that includes health education campaigns regarding fecal/oral transmission of diseases, and the transmission of helminthic infestations. It includes garbage disposal schemes and other inputs that would improve environmental sanitation and greatly reduce the incidence of diarrheal and other communicable diseases, currently prevalent in the NT2 Project intervention area. As such this, or a modified version of the, plan should serve as both “business as usual” and “best practices” strategies.

The NT2 Project may also consider doing the following:

**Establishing a Latrine Construction Revolving Fund**

It may be beyond the scope of the NT2 Project to provide financial support for the construction of safe water supply systems and/or the construction of latrines in every community in the project intervention area. This endeavor would also take many years. A relatively easier, and more cost-effective, approach would be to support the construction of latrines for every household. Many communities and households already understand the importance of using latrines to improve environmental sanitation and to prevent the transmission of diarrheal diseases and intestinal parasitic infestations. Many households simply do not have the financial resources to purchase materials to construct an appropriate latrine. The NT2 Project should consider, in consultation with local health officials, members of mass organizations, and district and village leaders, the establishment of a “latrine construction fund”. Depending upon decisions made at the village level, all families would be eligible for loans [in kind] to construct an appropriate latrine for their household. The time-frame for repayment of the loan, in cash, could vary depending upon the economic status of the borrower. Indigent families could be eligible for subsidized materials, but may have to contribute additional labor, depending upon decisions and agreements made at the village level. Repaid loans could either be returned to the NT2 Project, or remain as an on-going “revolving fund” for future village-level latrine maintenance and construction activities. The NT2 Project should support the construction of “water-seal”, or “hand-flush”, latrines as these are easier to maintain and have a longer life-use than “pit-latrines”. Latrine design, concerning floor, walls, roofing, etc. can vary but “water-seal latrine heads” should be attached to a cement foundation to ensure stability. Even if there is no major improvements made in the quality of potable water at the community level, the introduction and proper use of latrines, by all members of the household, will nevertheless have a dramatic effect on reducing the incidence, and prevalence, of diarrheal diseases and helminthic infestations.

**Conducting “Improved Personal Hygiene” Campaigns**

Poor personal hygienic practices contribute to the transmission of a wide array of communicable diseases, which are easily preventable. The NT2 Project should support health workers, village volunteers, and mass organizations [especially the LWU] to conduct “improved personal hygiene” campaigns for mothers in the resettlement communities, for other rural villages, and for school children. These campaigns should be of a participatory and demonstrative nature, rather than didactic lectures or speeches. Key issues to cover should at a minimum include, (1) the proper washing of hands with soap and water after defecating/urinating, and before serving food or eating meals; (2) regular trimming and cleaning of finger-nails; and (3) regular bathing [preferably at least once a day]. Active participation, in addition to being potentially enjoyable exercises, will allow all partici-
pants to demonstrate that they have learned new skills that will improve their health as well as perhaps that of other family members. It should be emphasized that a simple exercise like properly washing hands, after defecating/urinating, and before serving food or eating meals will dramatically reduce the incidence of diarrheal diseases and acute respiratory infections. This is especially relevant for young children, and the essential reason why mothers need to be taught these basic but potentially life-saving skills.

**Conducting Food Safety and Food Preparation Inspection Campaigns**

With the influx of a large number of construction workers and other migrants into certain sections of the NT2 Project intervention area, there will be an increase in the number of restaurants, food stalls, and markets preparing and handling food. These sites can potentially serve as focal points for the outbreak of water-borne diseases, as well as transmission points for foods containing intestinal parasites and/or pesticides. The NT2 Project should support local health authorities, mass organizations [e.g. the LWU], and other relevant agencies to monitor, on a regular basis, the quality of food sold in markets and at restaurants, food stalls, and other venues. Once again the campaigns should include participatory demonstrations to ensure that the target population acquires specific skills to reduce opportunities for communicable disease transmission. In addition to covering topics concerning “improved personal hygiene”, the inspection campaigns should cover the cleaning and handling of utensils used in the preparation and serving of food [e.g. pots, pans, plates, trays, glasses, spoons/forks/knives, cutting boards, water storage containers, containers used to wash utensils, etc.].

The course should cover the proper way to wash vegetables and meats before being cooked or served to ensure that potential pathogens and perhaps pesticides are not consumed. Those restaurants, food stalls, and other venues serving food demonstrating high hygienic standards should be presented with a formal certificate, which can be displayed in their establishment, attesting to their high food safety standards. Certificates should be presented annually to ensure that food safety and preparation standards are maintained. Those establishments that refuse to improve their food safety or preparation standards to a required level can be warned, fined, or closed down by the proper authorities. A similar campaign can be conducted in food markets and food stalls in district towns. Local authorities should support these efforts by providing all food establishments and market stalls with adequate supplies of garbage disposal baskets that are collected or emptied on a regular basis. Collection fees can be mutually decided upon between users and relevant government agencies.

7.2.6 Other Relevant Health Issues

Even if the above mentioned suggested “best practice” strategies are implemented successfully, many people in the project intervention area may still face a poor health prognosis. This is especially true for women of reproductive health and young children, living in remote areas, as the current health care delivery system is not able to properly address many of their immediate health needs. This report, and others, has illustrated the unequal distribution of health facilities and trained manpower between urban and rural areas, especially for remote ethnic minority communities. Without properly addressing this issue, health status will remain poor in these geographic areas. There may be less illness and death attributed to malaria, but women of reproductive age and young children may still become ill and die from preventable illnesses or conditions. Accessibility to contraceptives needs to be placed on a similar footing as that which was established for the distribution of insecticide treated bed nets. Increasing the availability of
contraceptives is the simplest means of reducing population growth and undue pressure on land and other local natural resources and social services. It is also the most cost-effective way to dramatically reduce maternal and infant mortality rates in a relatively short period of time. The technology is simple and user-friendly. It simply needs a more appropriate means of distribution to reach those in need, or wishing to receive, such services.

Two major constraints in improving health care for rural and remote areas concern accessibility and cultural acceptability. One of the reasons for this predicament is that the existing health service delivery system operates on a philosophy that promotes “facility-based health care”. What this means is that all potential clients and/or sick patients are required to physically travel to the district hospital or village health dispensary for services. While this may seem a logical approach from a medical perspective, it does not take into consideration that most people “in need” of basic health services are not ill. As such rural women will not necessarily take the time to travel far distances, by themselves or with their children, for ante-natal and post-partum examinations, contraceptives, and/or nutritional surveillance services when they have many other essential daily tasks to complete in and around their homes and fields. If the National Malaria Control Programme, followed a simply approach, rather than by making the distribution and re-impregnation of IBNs and the provision of EDAT available at the village-level, for all at-risk villages, it is doubtful whether that the incidence and prevalence would have declined to its present level. Contraceptives will probably save the lives of more women of reproductive age and infants than IBNs and EDAT interventions, yet this health service has a much lower priority. Equally disturbing is the fact that very few health professionals even understand the association between contraceptives, birth-spacing, improved health for mothers and young children, and reduced maternal and infant mortality rates.

Some of the ways to improve this situation may be to adopt the following “best practice” strategies:

**Establishing Special Scholarship Funds for the Deployment of Multi-Purpose Health Workers at Village Dispensaries**

Although there are too few health dispensaries in rural and remote geographic areas, an equally serious problem is that those deployed to these village-level facilities do not have the pre-requisite skills to provide high quality care. This situation will not dramatically change, in the near future, even with greater regularity of additional in-service training opportunities for health personnel deployed to these sites. The NT2 Project may wish to establish, in consultation with district, provincial, and national health authorities a special “scholarship fund” to train multi-purpose health specialists to work at remote village level health dispensaries. Training can cover many topics, but it must up-grade midwifery/obstetrics skills, general clinical care, communicable disease prevention, and counseling services. The trainees can include existing health personnel from provincial or district hospitals, or even from the health dispensary level. Courses can be conducted at both the provincial and national level, as well as consist of overseas training opportunities designed to up-grade specific competency-based skills/aptitudes [e.g. pre-and post test HIV counseling, the clinical management AIDS, etc.]. Trainees must agree, beforehand, to be deployed to selected rural/remote health facilities for a period of 3-5 years. As such “scholarship fund” may need to include a reasonable “hardship allowance” to serve as an incentive for highly skilled health workers to remain at their post for the required time period.
Supporting Efforts to “Move Beyond Facility-Based Health Care”

Health authorities, at all levels, must be re-oriented to appreciate that improving accessibility to basic health care needs to include regular outreach, and/or mobile clinic, visits to rural and remote communities. There are too few patients, whether in-patients or out-patients, to justify having a large number of health personnel permanently based at static facilities. Better coordination needs to exist between vertical health programs [e.g. Malaria Control, Safe Motherhood, Birth-Spacing, EPI, etc.]. This will reduce operational costs and ensure that the same target groups have access to a wide range of comprehensive promotive, preventive, curative care services that save lives, and which can be provided in or near their homes. Regularly scheduled mobile/outreach care clinics, if implemented properly, can also serve as on-site supervisory and continuing in-service training sessions for village level health workers, volunteers, and traditional birth attendants. These visits will also promote greater local participation and involvement in the provision of basic health services at the community-level. The NT2 Project should promote the establishment of a team approach, which utilizes health professionals and members of mass organizations. The NT2 Project should support daily allowance and operational costs. These budgets should complement and expand upon existing local health action plans and available resources.

Supporting On-Going In-Service Training Education For All Level of Health Care to be able to Address New Emerging Health Issues and Problems:

This report has indicated that within a relatively short period of time the NT2 Project intervention area may be facing considerably different health problems and issues. Although this may initially include a marked increase in the number of people, and families, suffering the effects of dramatic rise in the prevalence and incidence of HIV/AIDS, STIs, vehicular accidents, and mental health problems, it will eventually comprise a much broader range of health related issues. The Lao PDR will probably follow the same pattern witnessed by most of its neighbors in the region, such as Singapore, Taiwan, Malaysia, Thailand, and to a lesser extent China, Viet Nam, the Philippines, and Indonesia. Chronic and debilitating illnesses, associated with aging, life-style changes, and advances in medical technology, will promote the emergence of non-communicable diseases as the major cause of morbidity and mortality. These ailments are more difficult to treat or cure than the acute, and at times explosive, episodes associated with communicable diseases. For many patients treatment will never result in a cure. Similarly many of these individuals will need long-term follow-up care for many months, years, and/or for the remainder of their lives. The modalities employed to provide treatment to patients suffering from diabetes, hypertension, and cancer, for example, can be entirely different than that for dengue shock syndrome, profuse diarrhea, and other acute illnesses, both in terms of timeframe and the required types of medical and diagnostic equipment.

Health personnel, at all levels and at every health facility, need to be prepared to handle situations that may be substantially different from the ones they currently encounter. Health personnel will not acquire new health knowledge and skills by osmosis. They will need to be exposed to theoretical and practical training opportunities that provide them with a better understanding of the relevant issues involved, as well as a chance to develop and refine specific competency-based skills. The NT2 Project needs to anticipate, in advance, the realm of reasonable possibilities that may arise, and take the necessary measures to ensure that health personnel are ready to deal with these problems before they reach a criti-
cal point. As mentioned above the health picture in the NT2 Project intervention area will have already undergone certain major changes by 2010. By 2025 health workers will need a vast new array of skills, and medical equipment and supplies, to address a health scene dominated by non-communicable illnesses and conditions. As such the NT2 Project should consider developing a long-term health manpower plan that includes the provision of frequent on-going in-service training courses for the next 20-year period. This human resource development plan should cover all categories of health workers and village volunteers. It is also imperative that this plan include a special “scholarship fund” for post graduate studies in the fields of internal medicine, cardiology, urology, obstetrics-gynecology, radiology, surgery, and laboratory technology. Since many of these specialized services will not be available at the district level by 2010, and even perhaps by 2025, training opportunities need to be opened for provincial level health personnel. The NT2 Project may wish to explore whether a special “scholarship fund” can be developed to increase the quota for various categories of health personnel and specialists who could be trained [from the pre-service level on upwards through post-graduate studies] for future deployment to the NT2 Project intervention areas. Many types of post-graduate medical-health specialty training programs are currently available in Vientiane. Some trainees should, however, be eligible for long and short-term training opportunities at international renowned institutions in the region.

8 CONCLUSION:

The preceding sections have outlined a number of potential cumulative health impacts that may reasonably be expected to develop as the result of a combination of Nam Theun 2 Project interventions, and other external macro and micro-economic development schemes, during the periods 2005-2010 and 2010-2025. As one moves away from the present, and travels further into the future, there is obviously a greater chance that prophecies or predictions do not material. There are simply too many unknown factors. However many of the predicted scenarios, are based upon current and future development plans, as well as on the observation and experiences of how similar large scale infra-structure and general economic development projects, in neighboring countries, have affected health on a local, national, and at times regional basis.

This report has suggested that the most dramatic potential cumulative impacts may arise as a result of external factors, such as urbanization and migration, and not necessarily from some of the sector developments created by the Nam Theun 2 Hydropower Project [e.g. hydrology]. The convergence of a large work force, accompanied by perhaps thousands of camp followers and other migrants, to various localities in the Nam Theun 2 Project intervention will create conditions conducive for a substantial and perhaps explosive increase in vehicular accidents, STI & HIV/AIDS, and certain communicable diseases. The potential increased movement of ethnic minority communities, first as part of the planned resettlement scheme, and subsequently involving other developments on the Nakai Plateau and elsewhere may lead to a rapid breakdown in tradition values. Increased tension and conflict may develop between household members, especially those of different generations. Increased levels of stress will promote the onset of mental health problems. A large exodus of ethnic minority adolescents and young adults to Nakai and nearby district towns, and/or to other urban cen-
ters in the Lao PDR or Thailand, can also exacerbate feelings of disorientation and depression, which may result in alcohol and drug abuse, and other self-destructive behavior. The present health care delivery system is not prepared, or experienced, to handle any of these issues.

The Nam Theun 2 Project, in combination with other economic developments, such as the East-West Corridor, Savannakhet SEZ, and transnational bridges and thoroughfares closely linking the Lao PDR with Thailand and Vietnam, may also dramatically impact on population growth for the entire Central Region. Population growth rates are influenced by many diverse factors. At the most basic level population growth rates reflects the difference between the number of people being born, and those who are dying, in a particular area over a finite period of time [usually 12 months]. Thus if there are more births than deaths, a population will grow. Although low population growth rates are usually associated with a number of positive factors, they do not necessarily imply that the population in question is healthy. Many countries in Sub-Saharan Africa have very low population growth rates, but this is due to the tremendous number of HIV/AIDS deaths and not to high levels of contraceptive prevalence, low crude birth rates, low fertility, and other variables generally associated with a healthy population that has access to high quality basic health care services. A similar situation can develop in the NT2 Project intervention area with an explosive HIV/AIDS and vehicular accident epidemic.

Crude birth rates are also dependent on many variables that include the demographic age composition of the population, as well as several inter-related issues that influence the determinants of fertility for women of reproductive age. This can include median age at first marriage, age at the time of first sexual intercourse, marital status, percentage of eligible women using contraceptives, the desire for more children, and unmet need for contraceptives. Many of these variables can change over-time, but the large scale migration of adolescents and young adults out of rural communities and into urban areas in seek of employment have the potential to considerably speed up this process. Migration may positively interfere with certain variables, while negatively affect others. Many adolescents and young adults may either delay the time of their marriage, or will live away from spouses for extended periods of time. For the latter, this can act as a brake on high fertility rates. Migration may also positively affect fertility for those who are not married. Up until now the age of first sexual intercourse contact [for women] was closely associated with age at first marriage. Delaying the time of marriage could similar decelerate the number of births; especially for adolescents. On the other hand migration to urban areas, where many young women will not live with family members or relatives, can possibly lead to an increased onset of first sexual intercourse contact. It may also lead to higher rates of abortion, maternal mortality, as well as HIV/AIDS and STIs.

Depending upon the extent of the migration, from remote and/or rural areas, into district centers and urban areas, population growth may considerably decline locally [i.e. at the village level], but increase in, or be transferred to, other geographical locations. This process can lead to severely unbalanced, or unhealthy, economic growth as basic social services will be inadequate to serve the needs of a burgeoning urban population. Some of these issues are clearly outside the realm of the Nam Theun 2 Project. The project, itself, will not be able to establish measures to mitigate against such developments, the way it can for an increase in sediment leading to a decrease in water quality as a result of hydrology issues. Interventions need to take place at the national level. However dramatic potential impacts can nevertheless be felt at the household and community level. Who will
replace the “productive members” of a family or community, once a sizable propor-
tion of these individuals migrate elsewhere; or for that matter if they are seri-
ously injured or die from vehicular accidents or HIV/AIDS? Who will provide the
emotional and economic social support network for older and younger members
of the community?

This report has outlined a series of what it refers to as “best practice” strategies. They are intended to be guidelines for future action in anticipation of potential de-
velopments that may impact on health. Most are meant to be pro-active in na-
ture, hopefully stimulating discussions and prompt decisions, through a participa-
tory process, and not waiting until serious problems emerge, and in a very short
period of time possibly spin entirely out-of-control. Some deal with potential im-
pacts on health expected during the period 2005-2010. This will primarily focus
on ways to prepare local authorities, mass organizations, communities, and indi-
viduals for issues such as HIV/AIDS, STIs, vehicular accidents, mental health
problems, pesticides, and emerging communicable disease problems [e.g. den-
gue]. The “best practices” also suggest ways to improve the technical capacity of
the health care delivery system to effectively deal with current and new health is-
sues, but more important they focus on ways to make health care truly more ac-
cessible and culturally acceptable. The “best practice” strategies also suggest
ways to approach a new and vastly different health picture that will have evolved
by 2025. One that will be dominated by chronic non-communicable rather than
acute communicable diseases.
REFERENCES

The references for this report derive from discussions with government officials and health experts, in Vientiane, as well as with provincial and district health authorities at the Khammouane provincial health office, and the district health offices in Nakai, Nhommalat, Mahaxay, Nongbok, and Xebangfai. Brief discussions were also held with NTEC Office and government officials in Nakai District as well as with extension workers and village leaders/health workers in the model village of Nong Bua.

Discussions: Key Informants

- Dr. John Storey (Public Health Consultant/MOH, Former Senior Adviser to the “Lao-EU Malaria Control Project”, and Short Term Health Consultant to the NT2 Project from 1996-2001) and Dr. Bouasy Hongvanthong (Former Director of the “Lao-EU Malaria Control Project” and the Deputy Director of the Center for Malariology, Parasitology, and Entomology): concerning the control and prevention of malaria, dengue, opisthorchiasis, schistosomiasis, and other vector-borne diseases, as well as the issue of the re-introduction of malaria in Nakai and Nhommalat districts with the influx of construction and migrant workers.

- Dr. Chansy Phimphachanh (Director of the National Committee for the Control of AIDS) and her staff: concerning the current HIV/AIDS situation in the Lao PDR, future plans and initiatives to prevent and control the spread of HIV/AIDS, as well as the creation of potential “hot spots” for STIs and HIV/AIDS transmission in the NT2 Project intervention area.

- Dr. Bounpheng Philavong (Dep. Director of Health Services Improvement Project/MOH preparation phase) and Mr. Peter Miller (Coordination Unit/MOH): concerning objectives of the HSIP and potential coordination between the HSIP and the NT2 Project in Nakai and Nhommalat districts.

- Mr. Bounthavy Sisouphanthong (Director General of Cabinet, Committee for Planning and Cooperation, and former Director of the National Statistical Center): concerning macro and micro-economic development plans for the PDR (especially in Khammouane, Savannakhet, and Bolikhamsay), with projections on how these initiatives can affect migration, urbanization, population growth, and disease patterns in the Central Region of the Lao PDR.

- Dr. Choum Chomechaleun (Director of the Khammouane Provincial Health Office), Ms. Somvang Thepavong (Acting Head of the Provincial MCH Dept.), Dr. Viengkham Keothongdee (Deputy Director of the Nakai District Health Office), Dr. Namchai Utsa (Deputy Director of the Nhommalat District Health Office), Dr. Sipaseut (Director of the Mahaxay District Health Office) and staff, Dr. Inthong Hanpaseut (Director of the Nongbok District Health Office) and staff, and Dr. Bounbang Manivong (Deputy Director of the Xebangfai District Health Office) and staff: concerning existing health problems, as well as potential impacts of the NT2 Project on health.

- NTEC Project and GOL officials working in Nakai District and the Nong Boua model village, as well as village leaders and village health workers in Nong Boua. This included Mr. Hoei Phomvisouk, Ms. Keo-oula Soulyadet, Ms. Napha, Mr. Thongkeo, Mr. Khamvieo, Mr. Khamfong, Mr. Sieng, and Ms. Hai.
Discussions focused on planned health interventions for Nong Boua and other resettlement communities. On-site visit in Nong Boua included observations of newly constructed water and sanitation systems, house construction, as well as discussions with village health volunteers.

[A special note of appreciation is for Dr. Khamdone Volavong, senior staff member of the Mother and Child Health Center (MCHC)/MOH, in Vientiane who accompanied the consultant on the field-trip to Khammouane].

**Documents: Additional information was gathered from the documents listed below**


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(John Storey also provided the Cumulative Impact Assement investigating team with original notes and files concerning a health status assessment exercise he conducted in March 1996 for selected villages in the Nam Theun 2 Project Area. He also provided files and notes on various segments of the health section portion of the EAMP Report 1997).

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