ITEM 120-2802-R0903 PROPOSAL

Objectives and Needs

1. Centrality to the institution's approved mission.

Montana State University-Northern's approved mission statement is as follows:

> *A comprehensive regional university, Montana State University-Northern offers programs of professional preparation emphasizing discipline mastery, critical inquiry, and social responsibility in:*
> - *Teacher preparation*
> - *Mechanical and engineering technologies*
> - *Business and computer information systems*
> - *Nursing*
> - *Arts and sciences*
>
> *MSU-Northern applies emerging technologies in degree programs ranging from the associate to master's level. MSU-Northern prepares well-educated students who are capable of decisive action and application of new ideas. The university is committed to excellence in teaching, service to its region and the State, and applied research and scholarship.*
>
> *MSU-Northern values individualized attention to its students, experientially-based learning, and creating a culturally rich and intellectually stimulating environment. From its North Central Montana High Plains main campus, the University serves as a regional cultural center and maintains strong partnerships with communities, education, business and industry.*

The proposed associate of applied science degree in plumbing fits the mission of Montana State University-Northern. The institution has a long history of providing technical education to the citizens of Montana. In fact, that technical niche is the institution's unique role among the four-year campuses in the higher education community in the State of Montana. The new program in plumbing is a continuation of MSU-Northern's special commitment to education in the professional trades, and its history of creating high-quality, post-secondary training for those occupations.

The plumbing program also enhances the institution's service to the State of Montana, and strengthens its many strong partnerships with industry by adding one more important trade group to those important relationships. The support and advice provided by the plumbing community to the development of this degree program is strong evidence that MSU-Northern is in the initial stages of a long and important collaboration.

a. Goals and objectives. The goals of the proposed associate of applied science degree in plumbing, at Montana State University-Northern, are:

- to prepare students to be successful plumbing apprentices
- to prepare students for the licensure requirements of a journeyman plumber
- to provide another avenue of training and preparation for the plumbing trade
- to increase the number of skilled workers in Montana
- to provide another educational opportunity for the citizens of Montana

b. Intellectual basis for the curriculum. Because the plumbing trade is carefully regulated by the State of Montana, and because the licensure requirements for the plumbing trade are carefully defined by the State, instruction in the curriculum will be focused on the competencies expected as part of the apprenticeship training and tested at the time of licensure. Because Montana State University-Northern is committed to post-secondary education, however, the institution decided to propose an associate degree rather than a certificate program, to insure that students in the plumbing program are as prepared as possible for the higher level skills and basic competencies that come with a general education program and additional technical coursework. In today's highly skilled and ever-changing job market, workers with

some competencies in communication, critical thinking and interpersonal relations are more likely to succeed.

c. Course of Study. The following information is important about the proposed plumbing degree at Montana State University-Northern:

1) the proposed associate of applied science degree in plumbing satisfies the undergraduate degree requirements for associate degrees, as set out in Montana Board of Regents' policy 301.12.2.b. That policy reads as follows:

   The associate of applied science degree must comprise a minimum of 60 semester credits and is limited to a maximum 72 semester credits. The program of study is designed to prepare individuals for employment and contains sufficient general education or related education courses to satisfy regional accreditation association requirements. The degree title always carries a designation of the field of study.

   The degree, as proposed by MSU-Northern, contains 60 credits. The program is intended to prepare students for work as apprentice plumbers, and contains all of the general education credits necessary to earn a two-year degree from the institution. The degree will carry the title of an associate of applied science in plumbing.

2) the plumbing degree contains all of the general education courses required to earn a two-year associate of applied science degree from Montana State University-Northern. Those courses are: CIS 110, Introduction to Computers; ENGL 111, Written Communication I; MAAS 106, Elementary Technical Mathematics; SPCH 141, Fundamentals of Speech; three (3) credits in the mathematics/science distribution area (TSCI 205, Distribution Systems); and three (3) credits in the technology/applied arts distribution area (DRFT 131, Technical Graphics I).

3) slightly more than half of the credits required for the plumbing degree, 32 credits, are already part of the curriculum at Montana State University-Northern. Eighteen (18) of those credits are described in part 2), above, which sets out the general education requirement for an A.A.S. degree at Montana State University-Northern. The proposed plumbing program draws on existing coursework in basic electronics, basic welding, introductory drafting, industrial safety, first aid and water quality courses in hydraulics and distribution systems.

4) the remaining 28 credits are new courses in plumbing. Those 13 new classes include such topics as piping systems, plumbing fixtures, plumbing codes, advanced blueprint reading, energy management and so on.

5) the proposed A.A.S. degree in plumbing, and its attendant coursework, has been approved by the faculty at Montana State University-Northern, using the curriculum proposal and review process established by the Academic Senate at that institution. The chancellor and the provost have also approved the degree. The approval page for the degree is included as Appendix 1 with this Level II proposal. The draft catalogue copy for the A.A.S. degree is attached as Appendix 2; and a description of the new courses in plumbing is included as Appendix 3.

The plumbing profession is heavily regulated by the State of Montana. The important statutes are set out in Title 37, Chapter 69, part 3 of the Montana Codes. Among other important points, those statutes provide:

-- that only licensed journeyman or master plumbers can work in the field of plumbing in the State of Montana;
-- that aspiring plumbers must work a minimum number of years in the field, under the supervision of a licensed professional; and pass the licensure examination which tests both knowledge and skills in the plumbing trade;
-- that only the most skilled workers can become members of the plumbing profession, beginning with apprentices, who must work under licensed journeyman plumbers; journeyman plumbers, who must work under master plumbers; and master plumbers, who have established their

credentials through extensive training, supervision, work experience and testing. The details of these statutes are set out in subsequent paragraphs of this section of the Level II document.

Apprenticeship is the traditional entry point for most people interested in a plumbing career. Even though the Montana statutes require licensure as a condition for practicing the plumbing trade, those statutes also recognize apprenticeship training as an appropriate method for acquiring the necessary skills and experience to be a skilled tradesperson. Section 37-69-302 of the Montana Codes reads as follows:

> *Apprenticeship allowed. This chapter does not prohibit a person from working as an apprentice in the trade of plumbing with a plumber licensed by the department under the supervision of a licensed journeyman plumber. Only those apprentices registered with the department of labor and industry will be recognized by the department. The name and residence of each apprentice and the names and residences of their employers shall be filed with the department, and a record shall be kept by the department.*

Apprenticeship programs are also carefully regulated by the United States Department of Labor and the Montana Department of Labor and Industry. The U.S. Department of Labor, for instance, requires that all certified apprenticeship programs in the United States must include a minimum of 144 hours of traditional coursework each year in the particular trades area. States are permitted to mandate more than that minimum, and Montana has acted on that opportunity to require at least 200 hours of traditional coursework each year in all of its apprenticeship programs.

Plumbing coursework is not readily available in the State. Some plumbing apprentices satisfy this requirement by enrolling in programs established by plumbers unions throughout Montana. Most apprentices do not have access to those instructional programs, however, so their only alternative is to enroll in correspondence courses from the North Dakota State College of Science. Those classes are traditionally paid for by the licensed plumber employing the apprentice; and over the course of a five-year apprenticeship, plumbers-in-training in Montana will usually complete 1,200 hours of classes from the North Dakota school.

Following the apprenticeship period, as noted above, the next step in the licensure process is journeyman plumber. That process is set out in section 37-69-304 of the Montana Codes, and requires both experience and completion of an examination. The experience can be acquired in several ways, including:

- -- 5 years' work experience under a licensed journeyman or master plumber;
- -- completion of an apprenticeship program certified by the United States Department of Labor; or
- -- credit toward the five years of work experience by attendance at a plumbing program.

The specific language in the statute, dealing with schooling or formal training, is as follows: ". . .credit towards this experience requirement may be given for time spent attending an accredited trade or other school specializing in training of value in the field of plumbing and approved by the board (referring to the State Board of Plumbing)." That state board has also adopted an administrative rule that clarifies the education language in the above-cited statute. That rule, at Title 8, Chapter 44, rule 413.d.iii, of the Administrative Regulations of Montana, says:

> *The board may, in its sole discretion, give appropriate credit for the following. . .completion of a course of study in a technical institute or other recognized educational program, not to exceed two years of the five-year experience requirement.*

Montana State University-Northern worked closely with a master plumber, in developing this degree, to insure that the curriculum met the expectations of Montana law. While it is too early, at this point, to predict how much of the apprenticeship period will be satisfied by the proposed degree at MSU-Northern, Roy Symons from the Montana Apprenticeship & Training Program has assured the institution that "some of the apprenticeship will be satisfied." MSU-Northern will obviously work to insure that the maximum two-year credit is awarded to the proposed program. If the degree is formally approved by the Montana Board of Regents, MSU-Northern will prepare the necessary paperwork to receive formal approval from the State Board of Plumbing.

In addition to the classes outlined in the proposed degree program, MSU-Northern also intends to develop additional classes in plumbing to satisfy the requirement of at least 200 hours of traditional coursework during each year of the five-year plumbing apprenticeship. Those classes will be developed so they can be completed by distant students. The focus will be on electronic, Internet courses, but MSU-Northern will also consider its target audience in determining the most appropriate delivery method. The institution will work closely with the Extended University in developing this coursework, since that department administers all off-campus programs, including Internet delivery and continuing education coursework.

d. Prospective instructional methods or delivery by telecommunications. The proposed associate of applied science degree in plumbing will be delivered as a resident program on the campus of Montana State University-Northern in Havre, using traditional face-to-face and laboratory instruction. Once the program has been established, the institution intends to develop coursework for apprentice plumbers in the field. That coursework would be developed for two (2) audiences: apprentice plumbers who have completed the two-year degree at MSU-Northern and need additional coursework as part of their five-year training; and apprentice plumbers who are unable to relocate to Havre, Montana, to work on the two-year degree. At this point, the institution intends to focus on electronic, Internet courses for those distant students. But, as noted in the previous paragraph, MSU-Northern will survey its target audience and determine the most viable methods of delivery for these distant courses.

Based on all of this information, Montana State University-Northern feels confident that its proposed associate of applied science degree in plumbing will fill an important educational need for the State of Montana, and provide another avenue of training for the plumbing trade.

2. Need for program. The United States Department of Labor is predicting a significant increase in the number of plumbing jobs through 2010. That government agency estimates that the United States economy will need 37,000 new plumbers every year until 2010 to keep up with demand for that important skill.

The Association for Career and Technical Education (ACTE) describes the future of plumbing as follows:

> The U.S. Department of Labor's *Occupational Outlook Handbook* states that. . .the plumbing industry will employ 10 to 20 percent more workers through 2010. Because of the increased sophistication of the systems these technicians work on and the equipment they use, the prospects will be considerably better for those with technical school or formal training. (Emphasis added). Because of the universal need for the services of heating, air conditioning and plumbing specialties, they can work in any area of the country, on land or sea and in many foreign countries. There are few other industries that can boast this complete choice. In addition to the positive career outlook, the HVACR and plumbing industries offer a great variety of occupations, good benefits and excellent pay. Beginning. . .plumbers can expect to earn over $35,000 a year, while a seasoned technician, contractor, or engineer can earn up to $100,000 a year. (News release from ACTE, dated July 15, 2003.)

The U.S. Department of Labor also reports that plumbers are among the highest paid construction occupations, with a median hourly wage of $18.19 in 2000. According to the Department of Labor, apprentice plumbers typically start at about 50 percent of the wage rate paid to experienced plumbers, and that wage increases periodically as the apprentice worker acquires more skills.

Salaries in Montana mirror the national picture. A licensed journeyman plumber, in Montana's urban counties, averages about $22.50/hour for his/her work. That same journeyman plumber earns slightly less in rural areas, but the hourly wage still averages slightly over $20/hour. Those figures are based on a wage survey conducted in fall 2002.

The salary for Montana's apprentice plumbers is similar to the national story. Those apprentices can expect to earn about 50% of a licensed journeyman's wage, in the first years of their training. That salary typically increases, during the apprenticeship period, as the worker becomes more skilled.

The need for plumbers, and the employment opportunities for apprentice plumbers, is less specific in Montana. But the following information gives some idea about those opportunities:

- in a typical year, approximately 250 apprentice plumbers are registered with the State of Montana.
- since the statutes and regulations require a five-year apprenticeship before candidates can sit for the licensure examination, approximately 50 of those apprentices would be eligible to become plumbers in Montana each year.
- according to Roy Symons, apprenticeship and training specialist with the Montana Apprenticeship & Training Program of the Department of Labor and Industry, the average attrition rate for all apprenticeship program in Montana is between 12 – 15%. While that percentage is not specific to the plumbing trade, it can be used as a guide to suggest that approximately six (6) apprentice plumbers, in the original cohort of 50, fail to complete their training.
- the licensure test for a journeyman plumber is quite rigorous. According to the members of the Plumbing Advisory Board, who met on MSU-Northern's campus in mid-August, the "pass rate" is approximately 80 percent. That means that another 9 – 10 apprentice plumbers, who finally sit for the examination, fail to satisfy this last hurdle for licensure.
- in summary, therefore, approximately 35 new journeyman plumbers typically join the trade every year in Montana.

Information on the employment opportunities for those journeyman plumbers is more difficult to assess. The information for the U.S. Department of Labor and ACTE, at the beginning of this section, is positive. Specific information on the State of Montana is more problematic. The MSU-Northern Plumbing Advisory Board members, who gathered in Havre last month, provided the following information, when asked that question, however:

-- at the present time in Montana, the plumbing trade has no available and convenient pool of apprentice plumbers to draw from. Licensed plumbers ordinarily have to find their own apprentice employees, and according to the advisory board members, that can be a "hit or miss" proposition.
-- the closest educational program in plumbing is located at the North Dakota State College of Science in Wahpeton, North Dakota. Some Montana students attend that program, and a few of them can be enticed to return to the State as apprentice plumbers, the Board said. Most students in the North Dakota program do not come back to Montana, however, the Board members said.
-- students from the proposed plumbing program at MSU-Northern will be heavily recruited, the Plumbing Advisory Board said. As future apprentices, they have already demonstrated their interest and commitment to a career in the plumbing trade. They will also have made an investment in that career choice by attending the program at MSU-Northern, the Board members said. Both of those facts will make the graduates from MSU-Northern's plumbing program strong candidates for any apprenticeship openings in the State.
-- those students will have two (2) years of training when they are hired as apprentice plumbers. That will be significant, for most plumbers in Montana, because of the elevated skill level of the new employees and the decreased need to provide entry-level training for the promising apprentices.
-- the plumbing profession in Montana is aging. The average age of licensed plumbers in Montana is in the mid to late-40s, according to MSU-Northern's Plumbing Advisory Board members, and the need to replace those skilled craftsmen is significant.
-- Montana currently has about a third more licensed electricians than plumbers, according to the Advisory Board. The need for licensed plumbers is comparable, according to those Board members.

None of this information sets out specific numbers for apprentice plumber openings in the State of Montana. When the Plumbing Advisory Board was asked that question in early August, the Board members could not suggest a source of information for that detail. They all felt strongly that the graduates of a plumbing program at MSU-Northern would have no difficulty finding employment throughout the State and anywhere in the United States, however. The reasons for their strong feelings led to the list in the previous paragraph. For informational purposes, the members of the Montana State University-Northern Plumbing Advisory Board are listed in Appendix 4.

MSU-Northern has also received several letters of support for the proposed plumbing degree. Those letters are included in Appendix 5.

3. New courses the program will add; course requirements for the degree. This information is described under part 1.c. of "Objectives and Needs," on an earlier page of this Level II document. The new courses are marked by an asterisk in Appendix 2, and the course descriptions for those new courses are included in Appendix 3.

Adequacy, Accreditation and Assessment Issues

Montana State University-Northern will not seek specialized accreditation for its plumbing program, because no such accreditation exists.

Because all plumbers must be licensed in the State of Montana, however, the assessment of learning outcomes for the program will be relatively straight-forward. Faculty in the program will use the following measures to determine the success of the degree's learning objectives:

- -- percentage of graduates placed in apprentice positions following completion of the associate of applied science degree; the goal, initially, will be 90%.
- -- percentage of graduates who complete the apprenticeship period and sit for the licensure examination; the goal, initially, will be 80%.
- -- percentage of students who successfully pass the journeyman plumbers' licensure examination, once they sit for that examination; the goal will be 85% initially.
- -- annual employer satisfaction surveys to collect feedback on the strengths and weaknesses of the program graduates.

These four (4) measures should provide good information on the program's strengths and weaknesses, and especially the program's success in creating employment opportunities for Montana's citizens. The last two measures especially should help to identify knowledge and skill areas that need to be reevaluated, as the course content and curriculum in the plumbing degree is refined in subsequent years. Hopefully, the State Board of Plumbers can assist with the third measure by providing information on the content areas for those licensure candidates who failed the examination.

Impact on Faculty, Facilities, Costs, Students, and Other Departments and Campuses

1. Additional faculty requirements. The associate of applied science degree in plumbing will require the addition of one (1) new faculty member at Montana State University-Northern.

- -- that new faculty member must be a licensed plumber and have a baccalaureate degree in an appropriate technical discipline. Preference will obviously be given to a master plumber. The requirement of a bachelor's degree may be problematic for the institution, according to the Plumbing Advisory Board, because most master plumbers acquired their training on the job, and most typically that training did not include a college degree. The Board felt strongly, however, that the faculty member should be appropriately credentialed for a career in college teaching, and a bachelor's degree is often the entry level preparation for some of the technical programs at MSU-Northern.
- -- if the faculty member has only earned a bachelor's degree, he/she will be expected to earn a master's degree to remain at MSU-Northern; that additional credential will have to be approved by the provost before the new faculty member begins a program of study.
- -- the faculty member will be given the rank of instructor or assistant professor at MSU-Northern, depending on qualifications and experience; the assistant professor rank is ordinarily not awarded by the institution unless a faculty member has a master's degree.
- -- the starting salary for this faculty position will be in the $28,400 - $33,300 range, depending on qualifications. Because these potential faculty members can earn more than that projected salary, as practicing plumbers, the successful candidate will almost certainly have to be given a market adjustment. Since the salary range, quoted earlier in this paragraph, is just for an academic year, however, the faculty member in plumbing will also be eligible for summer school teaching. He/she could also use those summer months to supplement the salary by continuing to practice the plumbing trade. Based on the experience of the North Dakota State School of Science, this position may also include the opportunity to teach a significant number of continuing education credits for apprentice and licensed plumbers in the State of Montana. That additional

opportunity could generate $10,000 - $15,000 a year. Salaries at Montana State University-Northern are a significant concern, particularly when the institution attempts to hire qualified professionals and tradespeople who can make a much better salary in the private sector.

-- the faculty member in plumbing will teach 24 credits each year. That is the traditional teaching load at Montana State University-Northern, based on the faculty collective bargaining contract. That 24-credit teaching load will not change for the first six years of the program. . .and beyond. The number of new preparations can be reduced if the faculty member decides to teach the same 24 credits year after year, however.

-- since the new degree includes 28 credits of specialized coursework in plumbing, MSU-Northern will have to hire adjunct faculty to teach the remaining four (4) credits. Those part-time instructors receive $500/credit for their work, or an additional $2,000/year to deliver the plumbing classes. The specific courses taught by adjunct faculty members will almost certainly vary from year to year, depending on the expertise and interests of the full-time, tenure track plumbing professor. But the proposed coursework will require some help from part-time instructors.

-- MSU-Northern intends to recruit for the position in Montana and the Northwest region. Because of the support already shown for the program in the plumbing trades in Montana, the institution expects some help from that group to identify appropriate and experienced candidates for the faculty line.

Licensed plumbers in the northcentral Montana area, and especially a long-time plumbing contractor who is now semi-retired, have expressed interest in donating their services to MSU-Northern as the initial instructors in the program. Their commitment to the new degree is so intense that they are willing to launch the program and mentor it through its early years. Although the offer is unusual and generous, MSU-Northern is discussing the possibility with those Hi-Line tradesmen.

2. Impact on facilities. Montana State University-Northern has projected the following start-up costs for the plumbing program:

- a new dedicated laboratory will be created for the program; that laboratory can be established by renovating existing space on the MSU-Northern campus. The Brockmann Center has room for that laboratory, and the renovations are expected to cost $10,000. MSU-Northern has excess classroom space, at this point, and can absorb the additional lecture-based classes into its existing facilities.
- the institution will have to acquire new equipment for the program. That equipment is expected to cost $35,000. MSU-Northern has already received assurances from members of the plumbing profession in Montana that much of this equipment will be donated.
- MSU-Northern will also have to purchase tools for the plumbing degree. Those tools are expected to cost $20,000. Again, the plumbing profession in Montana has promised to help with the tools. In addition to the tools described above, students who enroll in the program will be expected to purchase a “starter” tool kit of their own.
- the program will also require materials in most of the laboratory settings. Some of those materials will be “consumed”, as part of the classroom instruction, and, therefore, the cost of the items can be recovered through careful assessment of student course fees. MSU-Northern still anticipates an additional, yearly expense of $1,000 for appropriate instructional materials.
- no special or dedicated computer laboratories are planned for this program. A computer system may have to be purchased for the new faculty member in plumbing, however, and that system is estimated to cost $5,000. If a current faculty member retires or resigns before the plumbing program is implemented, however, that departing employee’s computer equipment could be reassigned to the plumbing instructor.
- the program will require modest library holdings. Those materials are expected to cost $3,000 initially, with an annual investment of approximately $500 thereafter.

Montana State University-Northern has been assured, by several important members of the plumbing community in Montana, that most of the equipment and tool needs for the program will be donated to the institution through its Foundation. Those donations have not taken place, at the time this document was prepared, because the institutional benefactors are waiting to see if the program will receive Board of Regents’ approval.

3. Costs. The following is an estimate of the costs of the new A.A.S. degree in plumbing:

First Year or Start-Up Costs:	
Tenure-track faculty member, salary & benefits	$43,750
Adjunct faculty:	2,000
Library materials:	3,000
Computer equipment	5,000
Renovation of existing space for plumbing laboratory:	10,000
Equipment:	35,000
Tools:	20,000
Instructional materials, especially for laboratory courses:	1,000
Travel:	750
Advisory board meetings:	300
Office supplies and telephone:	400
Miscellaneous expenses:	1,000
Total:	**$122,200**

Biennium Costs:	
Tenure-track faculty member, salary & benefits	$87,950
Adjunct faculty:	4,000
Library materials:	3,500
Renovation of existing space for plumbing laboratory:	10,000
Computer equipment	5,000
Equipment:	35,000
Tools:	20,000
Instructional materials:	2,000
Travel:	1,500
Advisory board meetings:	600
Office supplies and telephone:	800
Miscellaneous expenses:	1,000
Total:	**$171,350**

Continuing Costs of the Program, Five-year Period:	
Tenure-track faculty member, salary & benefits	$48,000/year
Additional faculty position:	45,000/year
Library materials:	500/year
Computer equipment and upgrades:	6,000
Equipment:	10,000/year
Tools:	5,000/year
Instructional materials:	1,000/year
Travel:	1,000/year
Advisory board meetings:	500/year
Office supplies and telephone:	600/year
Miscellaneous expenses:	1,200/year
Total:	**$118,800**

Funding for some of these expenses was described in the previous section of this Level II document, entitled “impact on facilities.” The following information about funding sources supplements that information:

- -- the faculty salary will have to be absorbed by Montana State University-Northern, since it is a new line. The institution anticipates several faculty retirements in the next 1 – 3 years, however, and some of those positions will not be refilled. Eventually, and very quickly, the faculty positions in this new program will be covered by vacancy savings from existing, tenured faculty lines.
- -- no additional administrative support is required for the program. The College of Technical Sciences has two (2) administrative support people, and they should be able to absorb the additional work generated by this new academic program.
- -- personnel in student support services should also have no difficulty providing adequate and necessary services to the new plumbing students. Enrollments at MSU-Northern have not grown significantly in recent years; and while the support staff has been trimmed slightly because of budget cuts, the remaining staff should be able to provide quality service to the number of students expected in the early years of the plumbing program.
- -- expenses associated with adjunct faculty, travel, supplies, library materials, overhead and advisory board expenses will have to come from a reallocation of internal operating dollars. The University Planning Committee has already embarked on a process of shifting dollars from stagnant programs to areas of growth or potential growth.
- -- the travel dollars will be used for trips to Helena, to work with the Montana Department of Labor and its apprenticeship division; and continued consultation with members of the Plumbing Advisory Board.

4. Impact on enrollments, numbers of students, and number expected to graduate. Student numbers are always hard to predict, especially for a new, first-of-a-kind program in the Montana University System. The following is the institution's good-faith estimate:

- -- in the first year of the program, Montana State University-Northern hopes to enroll 7 students in the plumbing degree. By the third year, those numbers should increase to 10 students/year; and by the fifth year, the institution hopes to enroll at least 20 students/year in each entering class. Since the plumbing degree is a two-year program, 40 students could be plumbing majors at Montana State University-Northern by 2009.
- -- since the overall retention rate for the entire campus is about 70%, approximately five (5) students should make up the first graduating class in the program. By the third year of the program, using the estimates in the preceding paragraph, seven (7) students should graduate from the program. In subsequent years, those graduation numbers should average 14 students. The institution hopes to average 25 graduates/year by the seventh year of the degree. That would require approximately 36 majors/year or a total enrollment of approximately 72 students in the two-year program, using 70% as the typical retention rate at Montana State University-Northern. That enrollment figure is possible, particularly if the program builds a reputation for quality and successful job placement. Putting all of those estimates together, MSU-Northern anticipates that approximately 150 students could complete the A.A.S. degree in plumbing in the first ten years of its existence, or an average of 15 graduates/year.
- -- the program will require 1.167 faculty members to deliver the coursework. That number was determined by dividing the number of new courses in the degree program by 24 credits, which is the normal teaching load for a faculty member at Montana State University-Northern. (I.E., 28 credits/24 credits = 1.167.) The student/faculty ratio will change as the program matures. But the following information illustrates that concept:

    - for the first year, 7/1.167 = 6:1
    - for the third year, 20/1.167 = 17:1
    - for the fifth year, 40/1.167 = 34:1
    - for subsequent years, 72/1.167 = 62:1

- -- no special admission requirements will be developed for the program, except for the system-wide standards established by the Montana Board of Regents.
- -- no enrollment limits are planned, although the faculty in the plumbing program would have to be increased if the numbers reach a faculty student ration of 35:1.
- -- critical mass and break-even information are included on the cover sheet accompanying this Level II document.

5. Relationship to other programs on campus. As already noted earlier in this Level II document, under the section entitled **Objectives and Needs**, slightly more than half of the coursework for this degree will come from other academic programs at Montana State University-Northern. That coursework will include general education classes, and specific courses in the drafting, electronics, metals, water quality, health and physical sciences and general technology programs. The courses specific to the plumbing curriculum will almost certainly have little application for other programs on the MSU-Northern campus, except for those students who may be interested in learning specific plumbing skills.

6. Relationship to other institutions. No college or university in Montana offers a degree in plumbing. The North Dakota State College of Science, in Wahpeton, North Dakota, has a 36-credit certificate program in plumbing. No other plumbing programs were identified in Idaho, Wyoming, North Dakota or South Dakota.

The proposed plumbing degree at MSU-Northern is very similar to the North Dakota program, except that it contains more credits. Those additional credits include general education coursework and classes in different aspects of the plumbing trade. Hopefully, that additional training will mean a more skilled, competent apprentice who can contribute immediately to the work of a licensed journeyman plumber.

Students in the Wahpeton certificate program can complete additional coursework in heating and air conditioning systems and earn a two-year associate degree in Mechanical Systems. According to the degree inventory maintained by the Office of the Commissioner of Higher Education, two colleges in Montana offer similar degrees. The MSU-Billings College of Technology has an A.A.S. degree in heating, ventilation & air conditioning, and refrigeration; and Flathead Valley Community College offers a certificate program in heating, ventilation, air-conditioning and refrigeration. Similar programs were also available in Idaho and Colorado. The proposed plumbing degree at Montana State University-Northern is significantly different from those so-called HVAC programs, however. It focuses on concepts and skills appropriate to the plumbing trade; and it only moves into the HVAC arena to teach skills associated with so-called “wet heat” systems, which are typically handled by the plumbing profession.
Although no articulation agreements are planned, at the present time, because of the unique nature of the plumbing degree in Montana, such agreements are possible with schools in neighboring states if students decide they want to work in the heating and air-conditioning business.

Timeline for Implementation of the New Plumbing Program. The first classes in the plumbing degree will be offered Fall Semester 2004. Montana State University-Northern intends to use the intervening year to hire a faculty member, prepare the instructional space, purchase the necessary equipment, publicize the program throughout the State, recruit students and finalize any details with the State Board of Plumbers. Since the program will reside in the College of Technical Sciences at Montana State University-Northern, the dean of that College will have principal responsibility for those activities in collaboration with the provost.

The first graduates in the associate of applied science degree in plumbing are expected in Spring 2006.